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# THE EFFECTIVENESS OF A SPECIFIC PROGRAM BASED ON LANGUAGE DIAGNOSIS IN OVERCOMING LEARNING DISABILITIES OF MENTALLY RETARDED-EMOTIONALLY DISTURBED CHILDREN.

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DESCRIPTORS- *EXCEPTIONAL CHILD RESEARCH, *MENTALLY HANDICAPPED, *EMOTIONALLY DISTURBED, *LEARNING DISABILITIES, LANGUAGE, CHILDREN, LEARNING CHARACTERISTICS, LANGUAGE HANDICAPS, LANGUAGE ABILITY, REMEDIAL READING, REMEDIAL PROGRAMS, PSYCHOLINGUISTICS, SPEECH HANDICAPS, SPEECH THERAPY,

THE OBJECTIVES OF THIS STUDY WERE TO--(1) INVESTIGATE AND DESCRIBE THE LEARNING CHARACTERISTICS OF A GROUP OF MENTALLY RETARDED, EMOTIONALLY DISTURBED CHILDREN, AND (2) TEST THE EFFECTIVENESS OF A PSYCHOLINGUISTIC APPROACH TO THE REMEDIATION OF LEARNING DISABILITIES BY COMPARING THREE GROUPS--AN EXPERIMENTAL REMEDIAL TREATMENT GROUP, A COMPARISON REMEDIAL TREATMENT GROUP, AND A NON-TREATMENT GROUP. IN THE DESCRIPTIVE ASPECT OF THE STUDY, 32 EDUCABLE MENTALLY RETARDED, EMOTIONALLY DISTURBED CHILDREN (MEAN CHRONOLOGICAL AGE OF 12-6, MEAN MENTAL AGE OF 7-4, AND MEAN IQ OF 61) WERE GIVEN A DIAGNOSTIC BATTERY BASED ON AN EXTENDED MODEL OF PSYCHOLINGUISTIC FUNCTIONING. THE GROUP DID NOT EVIDENCE AN OVERALL DEFICIT IN THE ENTIRE AUTOMATIC-SEQUENTIAL LEVEL OF PSYCHOLINGUISTIC FUNCTIONING, A DEFICIT WHICH HAD BEEN POSITED IN OTHER RESEARCH AS TYPICAL OF THE RETARDED. EMOTIONAL DISTURBANCE AS WELL AS GROSS HETEROGENEITY IN THE GROUP'S PERFORMANCE WERE SEEN AS FACTORS PRECLUDING OBTAINMENT OF A SINGLE, GENERALIZED (I.E. TYPICAL) DEFICIT. IN THE REMEDIATION ASPECT, 15 OF THESE CHILDREN, MATCHED IN TRIADS BASED ON OBTAINED PSYCHOLINGUISTIC CHARACTERISTICS, WERE RANDOMLY ASSIGNED TO THREE GROUPS. EXCLUDING THE NON-TREATMENT GROUP, SUBJECTS WERE TUTORED INDIVIDUALLY FOR 30 SESSIONS. ALL 15 SUBJECTS WERE RETESTED ON THE 17-TEST DIAGNOSTIC BATTERY. THE EXPERIMENTAL GROUP, RECEIVING REMEDIATION BASED ON A LEARNING DISABILITY (I.E. PSYCHOLINGUISTIC) APPROACH, SHOWED GREATER GAINS IN DISABILITY AREAS AND OVERALL LEVEL OF PSYCHOLINGUISTIC FUNCTIONING THAN THE OTHER TWO GROUPS. THE NON-TREATMENT GROUP SHOWED GREATER GAINS THAN THE COMPARISON GROUP WHICH HAD RECEIVED TRADITIONAL REMEDIATION. THE PSYCHOLINGUISTIC APPROACH TO REMEDIATION OF LEARNING DISABILITIES WAS SEEN AS EFFECTIVE INASMUCH AS THE FACTOR OF ATTENTION WAS CONTROLLED BY INCLUSION OF A COMPARISON TREATMENT GROUP. FOURTEEN TABLES AND 77 REFERENCES ARE INCLUDED. (AUTHOR)

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Joseph G. Minskoff

May, 1967

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## TABLE OF CONTENTS

Page

LIST OF TABLES . . . . . . . . . . . . . . . . . . . . v

LIST OF FIGURES . . . . . . . . . . . . . . . . . . . . vii

ACKNOWLEDGEMENTS . . . . . . . . . . . . . . . . . . . ix

Chapter

I. STATEMENT OF THE PROBLEM . . . . . . . . . . . . 1

II. BACKGROUND OF THE PROBLEM . . . . . . . . . . . . 3

- Nature of the Population . . . . . . . . . . . . 3
  - Relationship of mental retardation to emotional disturbance . . . . . . . . . 3
  - Characteristics . . . . . . . . . . . . . . . . . 5
  - Education . . . . . . . . . . . . . . . . . . . 7
- Approaches to Remediation . . . . . . . . . . . . 8
  - Methods of remediation . . . . . . . . . . . 8
  - Global approach vs. learning disabilities approach . . . . . . . . . . . . 9
- Psycholinguistic Profile Approach . . . . . . . 11
  - Theoretical model . . . . . . . . . . . . . 11
  - Extended model . . . . . . . . . . . . . . . 14
- Research with the ITPA . . . . . . . . . . . . 16
  - Descriptive studies . . . . . . . . . . . . 16
  - Remedial studies . . . . . . . . . . . . . 22
- Summary of Background Information . . . . . . . 26
- Objectives of the Study . . . . . . . . . . . . 28
  - Hypotheses related to description of the sample . . . . . . . . . . . . . . 28
  - Hypothesis related to remediation . . . . . 29

III. METHOD . . . . . . . . . . . . . . . . . . . . . 30

- Subjects . . . . . . . . . . . . . . . . . . . 30
- Measuring Instruments . . . . . . . . . . . . . 46
- Procedure . . . . . . . . . . . . . . . . . . . 50
  - Group A treatment . . . . . . . . . . . . . 52
  - Group B treatment . . . . . . . . . . . . . 54
  - Comparison of A and B approaches . . . . . 55
  - Group C treatment . . . . . . . . . . . . . 57
  - Post-remediation testing . . . . . . . . . 57
- Methods of Evaluation . . . . . . . . . . . . . 57

Chapter Page

IV. RESULTS . . . . . . . . . . . . . . . . . . . . 59

Results Related to Descriptive Sample . . . . . . . . . . . . . . . . . . 59
Results Related to Remediation . . . . . . . . 66
Case Studies . . . . . . . . . . . . . . . . 66
Case A-1 . . . . . . . . . . . . . . . 67
Case A-2 . . . . . . . . . . . . . . . 73
Case A-3 . . . . . . . . . . . . . . . 78
Case A-4 . . . . . . . . . . . . . . . 85
Case A-5 . . . . . . . . . . . . . . . 89
Case B-1 . . . . . . . . . . . . . . . 96
Case B-2 . . . . . . . . . . . . . . . 100
Case B-3 . . . . . . . . . . . . . . . 104
Case B-4 . . . . . . . . . . . . . . . 108
Case B-5 . . . . . . . . . . . . . . . 113
Case C-1 . . . . . . . . . . . . . . . 117
Case C-2 . . . . . . . . . . . . . . . 121
Case C-3 . . . . . . . . . . . . . . . 125
Case C-4 . . . . . . . . . . . . . . . 128
Case C-5 . . . . . . . . . . . . . . . 132
Integration of results related to remediation . . . . . . . . . . . . . . 136
Summary of Results . . . . . . . . . . . . . 143
Descriptive results . . . . . . . . . . . . 143
Remediation results . . . . . . . . . . . . 144

V. DISCUSSION . . . . . . . . . . . . . . . . . . . 145

Learning Characteristics . . . . . . . . . . 145
Remediation . . . . . . . . . . . . . . . . . 147
Group A . . . . . . . . . . . . . . . . . 147
Groups B and C . . . . . . . . . . . . . . 149
Conclusions based on remediation results . . . . . . . . . . . . . . . . . 150
Limitations of the Investigation . . . . . . . 151
Size of the sample . . . . . . . . . . . . 151
Duration of remediation . . . . . . . . . . 151
Matching . . . . . . . . . . . . . . . . . 152
Nature of the sample . . . . . . . . . . . 152
Control of outside influences . . . . . . . 152
Need for supplementary diagnosis . . . . . 152
Recommendations for Further Study . . . . . . 153
Diagnosis . . . . . . . . . . . . . . . . . 153
Remediation . . . . . . . . . . . . . . . . 154
Implications for Special Education . . . . 156
Concluding Statement . . . . . . . . . . . . 157

Chapter Page

VI. SUMMARY . . . . . . . . . . . . . . . . . . . . 159

Statement of the Problem . . . . . . . . . . . 159
Objectives . . . . . . . . . . . . . . . . . . 159
Method . . . . . . . . . . . . . . . . . . . . 160
  Subjects . . . . . . . . . . . . . . . . . . 160
  Measuring instruments . . . . . . . . . . . . 160
  Procedure . . . . . . . . . . . . . . . . . . 161
Results . . . . . . . . . . . . . . . . . . . . 161
  Results related to descriptive characteristics . . . . . . . . . . . . . . 161
  Results related to remediation . . . . . . . 163
Discussion . . . . . . . . . . . . . . . . . . 163
  Learning characteristics . . . . . . . . . . 163
  Remediation . . . . . . . . . . . . . . . . . 164
  Limitations, recommendations, and implications . . . . . . . . . . . . . . . 165
  Conclusion . . . . . . . . . . . . . . . . . 166

REFERENCES . . . . . . . . . . . . . . . . . . . . 167

## LIST OF TABLES

Table Page

1. CA, MA, IQ, and Months in Residence of Total Sample . . . . . . . . . . . . . . . . . 32

2. Comparison of Matched Triads on CA, MA, IQ, and Months in Residence . . . . . . . . . . 34

3. Comparison of Language Ages for A-1, B-1, and C-1 on Pretest. Matched on Visual-motor Sequencing Deficit . . . . . . . . . . . . 36

4. Comparison of Language Ages for A-2, B-2, and C-2 on Pretest. Matched on Motor Encoding Deficit . . . . . . . . . . . . . . . . . 38

5. Comparison of Language Ages for A-3, B-3, and C-3 on Pretest. Matched on Vocal and Motor Encoding Deficits . . . . . . . . . . 40

6. Comparison of Language Ages for A-4, B-4, and C-4 on Pretest. Matched on Visual-motor Association Deficit . . . . . . . . . . . 42

7. Comparison of Language Ages for A-5, B-5, and C-5 on Pretest. Matched on Auditory-vocal Sequencing Deficit . . . . . . . . . . . . 44

8. T test Values of 16 Diagnostic Subtests Compared to Mean Language Age for the Total Sample of 32 Ss . . . . . . . . . . . . . 61

9. Comparison of Statistical Results and Individual Expected Levels for Determining Abilities and Disabilities . . . . 65

10. Rating of Improvements in Disability Areas for the Three Treatment Groups on the Basis of Case Study Profiles . . . . . . . . . . 137

11. Observations taken from Randomized Blocks Design showing Gains, in Months, for Three Treatment Groups . . . . . . . . . . . . . 139

12. Analysis of Variance of Differences between Pre- and Post-remedial Scores in the Disability Areas for each Triad . . . . 140

Table Page

13. Observations taken from Randomized Blocks Design showing Pre- and Post-remedial Differences between Mean Language Ages for Three Treatment Groups . . . . . . . . . . . 142

14. Analysis of Variance of Mean Language Age Differences between Pre- and Post-remediation for each Triad . . . . . . . . . . . 142

# LIST OF FIGURES

Figure Page

1. The Clinical Model for the Illinois Test of Psycholinguistic Abilities . . . . . . 13

2. An Extended Model of Communication Processes . . . . . . . . . . . . . . . . . . . 15

3. Comparison of A-1, B-1, and C-1 on Pretest . . . . . . . . . . . . . . . . . . 35

4. Comparison of A-2, B-2, and C-2 on Pretest . . . . . . . . . . . . . . . . . . 37

5. Comparison of A-3, B-3, and C-3 on Pretest . . . . . . . . . . . . . . . . . . 39

6. Comparison of A-4, B-4, and C-4 on Pretest . . . . . . . . . . . . . . . . . . 41

7. Comparison of A-5, B-5, and C-5 on Pretest . . . . . . . . . . . . . . . . . . 43

8. Sample of Remedial Lesson Plan . . . . . . . . . . 53

9. Profile of Mean Language Ages by Subtest for the Total Descriptive Sample . . . . . . . 60

10. Profile of Descriptive Sample Showing Mean Strengths and Weaknesses and Ranges of Language Ages per Subtest . . . . . . . . . . 64

11. Comparison of Pre- and Posttest Results for A-1 . . . . . . . . . . . . . . . . . . 69

12. Comparison of Pre- and Posttest Results for A-2 . . . . . . . . . . . . . . . . . . 76

13. Comparison of Pre- and Posttest Results for A-3 . . . . . . . . . . . . . . . . . . 82

14. Comparison of Pre- and Posttest Results for A-4 . . . . . . . . . . . . . . . . . . 87

15. Comparison of Pre- and Posttest Results for A-5 . . . . . . . . . . . . . . . . . . 93

Figure Page

16. Comparison of Pre- and Posttest Results for B-1 . . . . . . . . . . . . . . . . . . 98

17. Comparison of Pre- and Posttest Results for B-2 . . . . . . . . . . . . . . . . . . 103

18. Comparison of Pre- and Posttest Results for B-3 . . . . . . . . . . . . . . . . . . 106

19. Comparison of Pre- and Posttest Results for B-4 . . . . . . . . . . . . . . . . . . 111

20. Comparison of Pre- and Posttest Results for B-5 . . . . . . . . . . . . . . . . . . 116

21. Comparison of Pre- and Posttest Results for C-1 . . . . . . . . . . . . . . . . . . 120

22. Comparison of Pre- and Posttest Results for C-2 . . . . . . . . . . . . . . . . . . 124

23. Comparison of Pre- and Posttest Results for C-3 . . . . . . . . . . . . . . . . . . 127

24. Comparison of Pre- and Posttest Results for C-4 . . . . . . . . . . . . . . . . . . 131

25. Comparison of Pre- and Posttest Results for C-5 . . . . . . . . . . . . . . . . . . 135

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# CHAPTER I

## STATEMENT OF THE PROBLEM

Special educators have long been concerned with the problem of identifying and treating learning difficulties in children of varying exceptionalities. Most attention has been directed toward remediation of reading problems since this has appeared to be the most prevalent of all learning problems. Historically, many programs and techniques have been developed which have provided workers in the area of learning disabilities with a multitude of methods for diagnosing and remediating. However, as Weiner (1962) has suggested, many of these programs and techniques have been routine and non-specific. The advent of the Illinois Test of Psycholinguistic Abilities or ITPA (McCarthy and Kirk, 1961) as a diagnostic instrument sparked a variety of descriptive, correlational, diagnostic, and remediational studies, which have led to what appears to be a next step in this type of educational research: that is, a controlled, comparative study which tests the effectiveness of a specific remedial program based on the profile provided by the theoretical model upon which the ITPA was founded.

Research attempts at evaluating educational innovations, especially remedial approaches, have, in general, been superficially controlled. Such research often yields results upon which important educational changes are made. Such changes are not often warranted in that one rarely knows if gains are due to the experimental treatment itself or the fact of attention; therefore, a design which employs three groups must be considered as vital in order to reduce speculation concerning gains or any other results obtained.

Since one of the major goals of special education is the systematic diagnosis and treatment of specific learning disabilities, the onus is placed on the special educator to provide evidence that such a learning disabilities (e.g., psycholinguistic) approach to remediation will produce results significantly greater than will any other method. Hence, one purpose of this study was to test the effectiveness of the psycholinguistic approach to the remediation of learning disabilities.

Little is known about the child who is concomitantly mentally retarded and emotionally disturbed, although studies abound in various areas (e.g., classification, diagnosis, treatment, etc.) of the mentally retarded and emotionally disturbed as separate and independent entities. Unquestionably, such a population exists and, in view of the paucity of research concerning learning characteristics of this multiple handicapped group, there is presented to the special educator a challenge to investigate this complex problem systematically and meaningfully. Hence, another purpose of this study was to investigate and describe the learning characteristics of a group of mentally retarded-emotionally disturbed children, heretofore unstudied in this respect. This same group also served as the sample in the remediational aspect of this study.

# CHAPTER II

# BACKGROUND OF THE PROBLEM

The literature is discussed on the basis of four major aspects: nature of the population; approaches to remediation; psycholinguistic approach to remediation; and research related to the ITPA. Following the review, the hypotheses of the investigation are stated.

## Nature of the Population

### Relationship of mental retardation to emotional disturbance

Until the distinction between the psychotic and the feebleminded was made explicit by Esquirol in 1838 (Shaffer and Lazarus, 1952), the two conditions had almost always been equated. Beier (1964) attributed this to the many observable similarities between psychotic reactions and the behavior of the more profoundly retarded.

Students of psychopathology in the late eighteenth and early nineteenth centuries, stimulated by medical as well as humanitarian advances in the care and treatment of the psychotic and mentally retarded, began focusing increased attention on the relationship between the two. As the two types of behavior were gradually differentiated, they were classified into relatively crude classification systems. This separation continued until the period of Itard and Seguin, at which time Seguin noted that some cases of idiocy might be complicated by psychoses. In addition, he classified the dominant psychotic reaction patterns found in the mentally retarded as the over-reactive, aggressive, acting-out variety and the withdrawn, under-reactive type.

Early in the twentieth century, grossly speculative reports and surveys, such as those by Dugdale (1900) and Goddard (1912) concerning the Juke and Kallikak families, resulted in "views of mental retardation as a stream of malevolency from which flowed delinquency and crime, illegitimacy and degeneracy, pauperism and disharmony, as the source of problems and burdens in every phase of human existence" (Beier, 1964, p. 455).

The last five decades have evidenced a variety of trends and assumptions characterized by controversial notions concerning the relationship of mental retardation to emotional disturbance. Such notions covered the heredity-environment controversy, predisposition to insanity of the retarded, segregation, and sterilization.

Beier (1964) has pointed out that these early writers were primarily concerned with the nature, frequency of co-existence, and matters of differential diagnosis relative to these two conditions and that generally, their study of this problem was not systematic, with many conclusions being based on relatively casual observations and speculation rather than on data.

More recently, however, a number of workers have agreed on definitive views concerning the association between mental retardation and behavioral disturbance in the same child. Robinson and Robinson (1965) noted that retarded children seem to be especially vulnerable to emotional problems because of their intellectual handicaps. "Their deficiencies in judgment, in understanding of their environment, and in anticipation of the results of their behavior constantly lead them into situations in which they experience failure and punishment" (p. 224). They further observed that low intelligence is only one of many factors which are related to a child's emotional behavior. That the child is not always accepted or understood at home, that the parents may be mentally retarded, or that there may be discrepancies between psychological level of development, physical size, and/or cultural expectancies all combine to produce further problems.

## Characteristics

Chess (1962), in describing an experimental program of psychotherapy with mentally retarded children who have behavior problems, delineated five psychiatric sub-groups based on symptomatology ranging from retardation without psychological problems to, in effect, pseudo-retardation. Two of Chess' classificatory sub-groups, pertinent to the present population, are described below:

> Retardation with neurotic behavior disorder. These are children who in addition to behavior which represents their limitation of comprehension, show also stereotyped behavior of a neurotic nature and defensive reactions which denote a fixed and inappropriate view of the environment. Alteration of the environment is insufficient in itself to produce a change in behavioral defenses.
>
> Retardation with behavioral representation of brain injury. These children, in addition to behavior representing limited comprehension, show difficulties of perception and/or cognition as a result of brain damage (p. 864).

The relationship between psychosis and mental deficiency has also been explored by Masland, Sarason, and Gladwin (1958) who pointed out that psychosis is found at all levels of subnormal functioning. Noting that the schizophrenic type of reaction is the most frequently found psychosis among the mentally defective, Masland, et al. concur with the views of Garfield (1963), Robinson and Robinson (1965) and Beier (1964) that the incidence of mental illness among the mentally retarded appears to be much higher than in the general population. Masland, et al. further pointed out that nearly every major psychotic symptom which has been described in non-defective patients has also been noted in many defective cases. Hence, there is little justification for the generalization that when psychosis occurs in the mentally defective individual, it is necessarily less "complex" than when found in the non-defective individual. Neither is there any support found for the generalization that psychosis or psychotic-like behavior in the defective individual tends to be of short duration.

A further attempt at describing the present population comes from Benton (1964) who, as did Chess (1962), provided a list of plausible interpretations concerning the nature of the association of the two conditions. Benton related four particular interpretations noting that: (1) the association may be of a coincidental nature; (2) the association may be the expression of a "single basic process" (e.g., brain injury); (3) the psychopathological traits may be a result of the "primary intellectual deficit"; or (4) the intellectual deficit may be a result of the "primary psychopathological process."

It is reasonable to assume that a number of other hypotheses might be put forth to explain the concomitance of mental retardation and behavioral disorder. Further breakdown might distinguish between the major psychoses, neuroses, and some minor behavioral disturbances as well as degree of retardation; however, many writers (e.g., Robinson and Robinson, 1965) have emphasized the undesirability of attempting to separate emotional maladjustment from mental retardation in children. The contention here is that children respond to a stress or a defect in any sphere of life; therefore, most children tend to show mixed symptoms in all spheres.

All of the hypotheses are hard pressed to completely define a heterogeneous population such as the one used in this study. Each may be applicable to some children with similar symptomatology, but none are adequately descriptive of all. Hence, the nature of the group called mentally retarded-emotionally disturbed must be, for the present, seen as a population of individuals bound together by mild to moderate retardation as defined by standard IQ measures and a cluster of symptoms which, taken singly or together, present a picture of behavioral and emotional disturbance. Menolascino (1965) has provided the label of "mixed cases" in reference to this group. Toussieng (1964) has put forth, with simplicity, perhaps the most encompassing description of this group of children.

> These children reflect not only their heredity, their congenital strengths or weaknesses, their low intellectual ability, but much more what has happened to them as they tried to grow and others tried or failed to help them with more or less skill and more or less pute motive. Something or many things didn't click, either because of factors in the child, or in the environment, or in both, and as long as we receive the child we see the end products of his long, painful, frustrating, but futile struggle to carve out a place and a role for himself in his home and community. We also see the ways in which these children have tried somehow to hold on, either by defying all structures and just living for the impulses, or by withdrawal, or by closing themselves off from further learning, or by delinquent, hostile behavior, or by staying immature and young, or many, many other ways (p. 2).

There is little doubt that emotional disturbance in the mentally retarded covers a broad spectrum of symptoms. Most writers would support the notion that the coalescence of the two conditions creates a difficult, if not hazardous, diagnostic situation for the clinician or special educator. The diagnostic problem is not necessarily to discover whether emotional disturbance or mental retardation exists, or even which came first, but as Robinson and Robinson (1965) suggested, to uncover the depth and nature of both conditions. An addendum to this diagnostic intent should be systematic judgments concerning the educational condition as well as specific educational plans.

## Education

Research on the emotional and psychological characteristics of the retarded-disturbed has been comprehensively explored by Garfield (1963), Beier (1964), and others;

however, there is no evidence provided in the literature to show that remedial education, on an experimental basis, has been performed, successfully or unsuccessfully, with this population. Although they refer only to the emotionally disturbed, Haring and Phillips' (1962) argument is quite applicable. They have stated, "It is widely believed that the education of the emotionally disturbed child should be secondary to the treatment . . . very little attention has been given to the development of teaching methods" (p. 17). It is a safe assertion then, that, based on the recent historical and descriptive reviews of this unique population by Masland, et al. (1958), Garfield (1963), Beier (1964), Robinson and Robinson (1965), and others, remedial education is conspicuous by its absence, and controlled research in this area is long overdue. This is understandable in view of the varied characteristics of this population which have precluded the use of any single approach to diagnosis and remediation of learning difficulties within this group. Furthermore, the heterogeneity of these children has apparently discouraged analysis of possible patterns of learning characteristics.

## Approaches to Remediation

### Methods of remediation

Before discussing the literature pertinent to this section, it is important to clarify the concept "approach." As distinguished from the terms "method" or "technique," an approach to remediation encompasses the basis or rationale on which techniques and methods for remediation are employed. A method or technique is a specific way of teaching.

Most of the literature concerned with methods pertain to those which are used in the remediation of reading problems since reading disability, of all the possible learning disabilities, occurs most frequently (Bateman, 1964, b). Descriptive reviews of those methods which have become relatively standard through the years have been put forth by authorities such as Kirk (1940), Fernald (1943), Vernon (1958), Collins (1961), and Smith (1965).

Among the most basic and reliable remedial methods which appear to have withstood many fads and catch-all techniques in education over the years are the following: Fernald's kinesthetic method in which the child learns by tracing letters and words (Fernald, 1943); Gates' visual approach to word recognition (Gates, 1947); Monroe's sound-tracing methods based on a comprehensive educational profile of errors (Monroe, 1932); and the Hegge, Kirk, and Kirk Remedial Reading Drills (1940) which employ a phonics approach.

In the area of perceptual-motor development, the work of Itard, Seguin, and Montessori has influenced remedial education in countless ways (Talbot, 1964; Montessori, 1964). Descriptions of various other remedial methods are discussed by Schiffman (1962) and Bond and Tinker (1957).

### Global approach vs. learning disabilities approach

The comparison of these two approaches was an inherent experimental facet of this study. One "learning disabilities" approach is discussed in more detail in the succeeding section; however, a differentiation between these two approaches is in order at this point.

The learning disabilities approach constitutes a comprehensive diagnosis of a child's weaknesses and strengths, upon which is based a specific, systematic application of a plan of remedial treatment, which takes into account the nature of the child. In contrast, the remediation provided in the global approach is often unrelated to the child's learning characteristics (i.e., weaknesses and strengths). Furthermore, Bryant (1964) has noted that "remedial procedures often confuse and obscure the very learning they are attempting to bring about" (p. 197). In the global approach the child's learning characteristics may or may not be diagnosed. If they are diagnosed, the remediation which ensues is not necessarily related to them. If the remediation of the global approach is based on anything, it is usually based on some broadly identified problem such as "brain injury," "lack of motivation," and the like. Furthermore, as Johnson and Myklebust (1965) pointed out, the global approach may be method oriented (i.e., techniques which are in vogue are randomly used) while the learning disabilities approach is child or problem oriented. Hence, the global approach differs from the learning disabilities approach in that in the former remediation is not based on a diagnosis of the appropriate symptoms of the learning disability. As noted previously, many remedial educators have retained such a routine (i.e., global) approach.

To further differentiate the two approaches the following example is provided. A child with a reading disability who is weak in word recognition but adequate in phonics may be taught by a sight (i.e., look-and-say) method with the global approach because the remediation has no binding relationship to the diagnosed weaknesses and strengths. On the other hand, with a learning disabilities approach such a child would be taught reading by a phonics method. Hence, the global and learning disabilities approaches differ in that the latter uses the child's abilities to bring up his disabilities (both of which have been identified in the diagnosis) while the former does not.

It should be noted that the methods employed in remediation are not sacred to one approach or the other; that is, a method such as the phonics program of the Hegge, Kirk, and Kirk Remedial Reading Drills (1940) may be used in the global approach as well as the learning disabilities approach (e.g., the psycholinguistic approach). The difference between the utilization of the specific methods is that in the learning disabilities approach methods are selected because they fit the child's learning characteristics; however, this is not necessarily true for the global approach.

Among the authors who discuss approaches to complete systematic assessment, which follow somewhat the learning disabilities approach, are Brueckner and Bond (1955) and Schiffman (1962). The work set forth by Kirk (1966), however, seems to best exemplify the learning disabilities approach.

Notwithstanding the notion that one approach may be preferred or even better than another, the writer agrees with Balow (1965) who suggests that there is a lack of research available to support successfully the effects of remedial instruction. Follow-up studies by Collins (1961) as well as Lovell, Byrne, and Richardson (1963), using extensive samples, showed that the ultimate effects of remedial instruction, be it individual or group, produced no significant improvement in their respective samples. Balow asserts that any studies which claim substantial gains during or shortly after remediation (including those by Collins and Lovell, et al.) usually show longitudinally that the progress made by subjects diminishes over periods of time. The problem which arises, then, in addition to that of diagnosing and remediating disabilities, concerns the fact of attention to the children during remediation. That is to say, mere attention may be sufficient enough to change their performance for a short period of time (Lovell, et al., 1963).

## Psycholinguistic Profile Approach

### Theoretical model

The learning disabilities approach used in this study was a program based on a psycholinguistic approach to remediation. Inherent in this approach are two qualities which distinguish it from other diagnostic and remedial programs. The first concerns the fact that it is based directly on a theoretical model of communication or psycholinguistic ability.

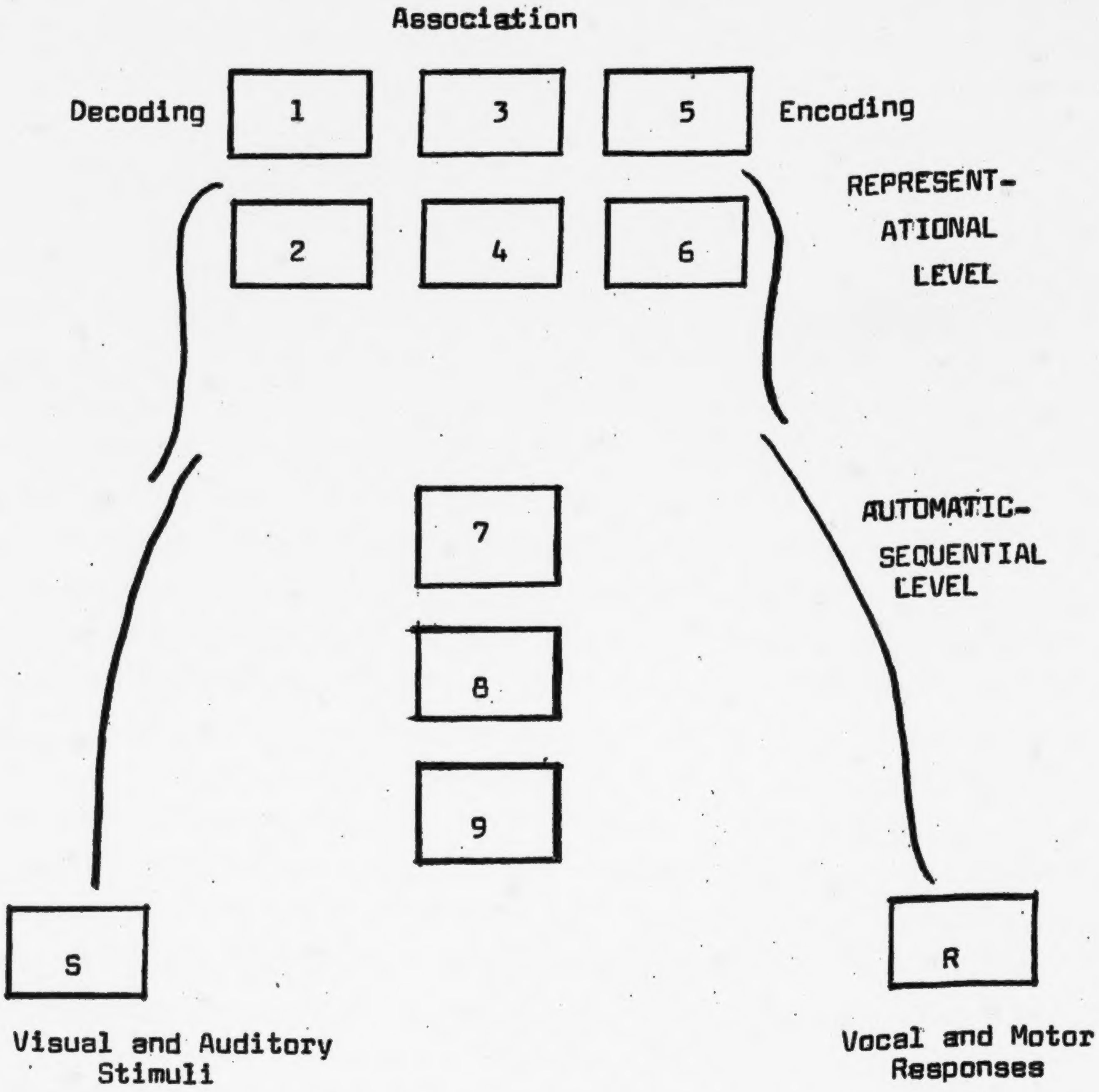
This refers to cognitive functions related to receptive (decoding), integrative (associative), and expressive (encoding) processes. The second quality is distinctive in that the ITPA (McCarthy and Kirk, 1961), the major instrument in the psycholinguistic model employed in this study, yields a profile of separate psycholinguistic abilities, suggesting an identifiable pattern of strengths and weaknesses which exist in a child and upon which a specific remedial program can be planned.

Much of the current thinking in the area of learning disabilities grows out of Osgood's (1952; 1957) theory which conceived of behavior as a two-stage process, that is, decoding the significance of received signals and encoding intentions into overt acts. According to Osgood, both decoding and encoding processes were assumed to involve three interactive levels of organization . . . a projection level, an integration level, and a representational level.

On the basis of the Osgood theory, Sievers (1955) developed the Differential Language Facilities Test (DLFT). This was comprised of a series of subtests designed to measure various aspects of language in pre-school children. McCarthy (1963) employed the DLFT in order to explore the language behavior of cerebral palsied children.

Osgood's theory also provided the basic rationale for the ITPA model shown in Fig. 1. The ITPA model presents three dimensions of language:

1. the channel utilized in communication . . . auditory-vocal or visual-motor;
2. the level of organization
    a. representational level . . . mediates activities requiring the meaning or significance of symbols
    b. automatic-sequential level (or integrational level) . . . mediates activities requiring the retention of symbol sequence;
3. the psycholinguistic processes
    a. decoding (understanding)
    b. association (making relationships)
    c. encoding (expressing).


Association
Decoding
1
3
5
Encoding
2
4
6
REPRESENT-
ATIONAL
LEVEL
7
8
9
AUTOMATIC-
SEQUENTIAL
LEVEL
S
R
Visual and Auditory
Stimuli
Vocal and Motor
Responses

Representational Level

1. Auditory Decoding
2. Visual Decoding
3. Auditory-Vocal Association
4. Visual-Motor Association
5. Vocal Encoding
6. Motor Encoding

Automatic-Sequential Level

7. Auditory-Vocal Automatic
8. Auditory-Vocal Sequential
9. Visual-Motor Sequential

Figure 1. The Clinical Model for the Illinois Test of Psycholinguistic Abilities (McCarthy and Kirk, 1961, p.5).

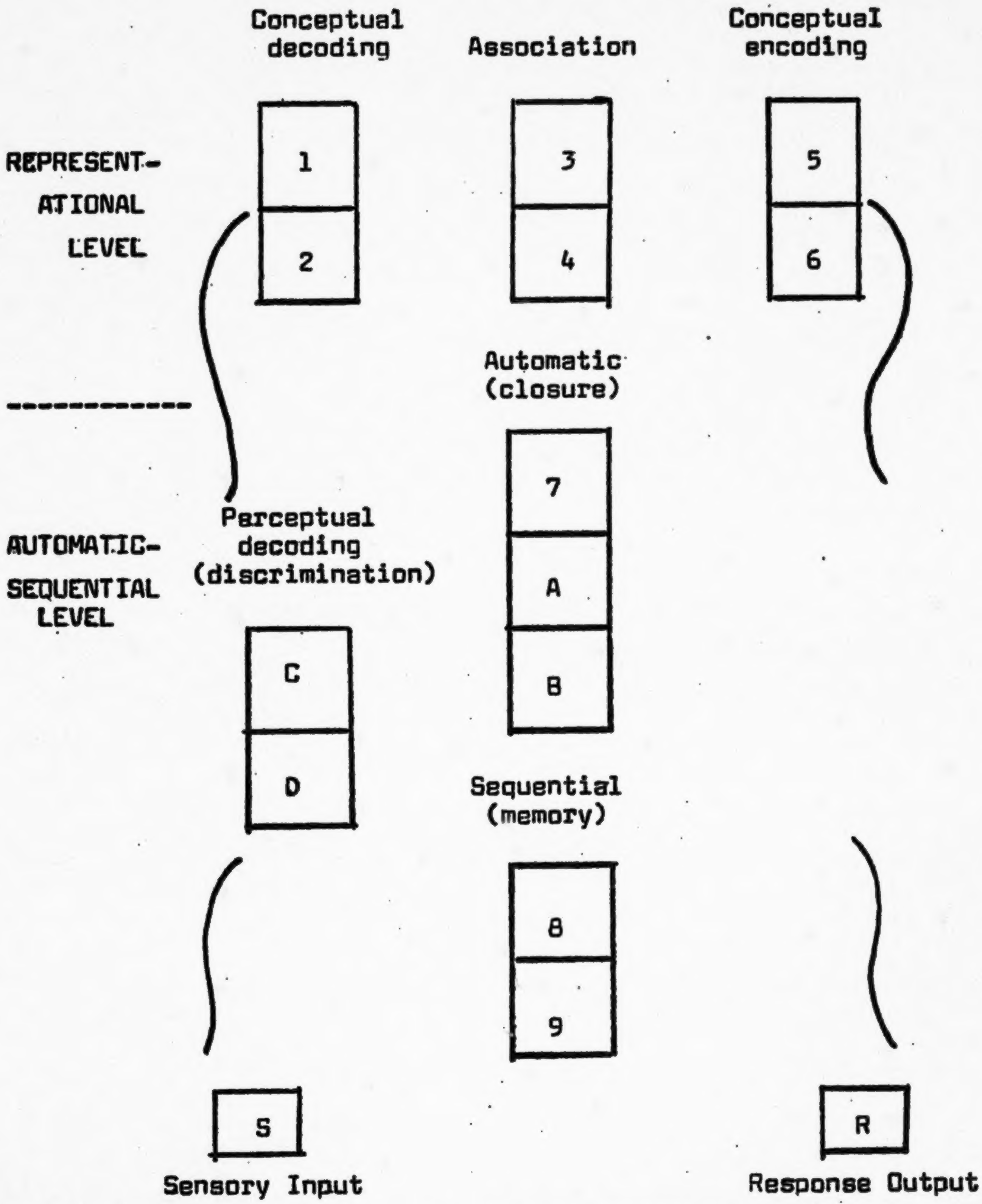
Kirk and McCarthy (1961) offer a comprehensive discussion concerning the models for both the ITPA and Osgood's theory of communication processes. As opposed to an omnibus test of classification such as the Stanford Binet or Wechsler scale, Kirk and McCarthy stress that the ITPA is a diagnostic test of language abilities developed to help bridge the gap between diagnosis and specific remediation. It contains nine subtests and is designed for use with children between the ages of two and one-half to nine.

Extended model

Figure 2 presents an extended model of the ITPA, designed to serve as the experimental (i.e., psycholinguistic) approach to diagnosis and remediation in this investigation. Four tests were added at the integration level to permit further evaluation of specific psycholinguistic abilities. These were tests for auditory closure (Monroe, 1932), visual closure (Kass, 1962), auditory decoding . . . perceptual (Wepman, 1960), and visual decoding . . . perceptual (Frostig, 1961); thus, bringing the total number of subtests to seventeen.

Frostig (1966) has recently expanded her approach to the diagnosis and remediation of perceptual-motor problems to include communication processes (i.e., the ITPA) and higher mental processes (i.e., the WISC). Although the new Frostig profile bears resemblance to the profile approach employed in this investigation, the two were developed independently. This is notable in that more and more authorities have begun to recognize the comprehensive advantages to the learning disabilities approach, and appear to be converging toward a more encompassing diagnostic-remedial frame of reference.

Chapter III provides the description and rationale for all the subtests included in the extended ITPA model.


Conceptual decoding
Association
Conceptual encoding
REPRESENTATIONAL LEVEL
1
2
3
4
5
6
Automatic (closure)
AUTOMATIC-SEQUENTIAL LEVEL
Perceptual decoding (discrimination)
7
A
B
C
D
Sequential (memory)
8
9
S
R
Sensory Input
Response Output

Representational Level

1. Auditory decoding
2. Visual decoding
3. Auditory-vocal association
4. Visual-motor association
5. Vocal encoding
6. Motor encoding

Automatic-Sequential Level

7. Auditory-vocal automatic
8. Auditory-vocal sequential
9. Visual-motor sequential

A. Auditory closure
B. Visual closure
C. Auditory discrimination (decoding--perceptual)
D. Visual decoding (perceptual

Figure 2. An extended model of communication processes, adapted from Kirk and McCarthy's ITPA model (1961).

## Research with the ITPA

Since its publication in 1961, most research related to the ITPA has clearly fallen into three categories: statistical, descriptive, and remediational. In view of the fact that this study was concerned with remediation primarily, and descriptive characteristics of a population secondarily, the review which follows is restricted to relevant research on the problems outlined in this investigation. Reviews of statistical studies may be found in Bateman (1964, a), McCarthy and Kirk (1963), McCarthy and Olson (1964), McCarthy (1965), and Weener, Barritt, and Semmel (1967).

### Descriptive studies

Olson (1960) compared performances of 27 receptive aphasic (RA), 14 expressive aphasic (EA), and 25 deaf (D) children on the ITPA. The comparisons, it was hypothesized, would uncover differing patterns of responses among the three groups and perhaps pave the way toward a relatively clear-cut method of differential diagnosis. In addition, the ITPA profiles were to be related to clinical diagnoses. Olson's subjects ranged in age from five to nine and one-half years and had IQs relatively close to the normal range.

The results showed that the differentiating pattern for the EA and RA groups was in auditory input and motor output. The RA group seemed to be linguistically homogeneous, while the EA group was varied. That is to say, Olson's findings indicated that the profiles of the RA, but not the EA subjects, could be predicted and that there was agreement between the ITPA profiles and clinical diagnoses for the RA group, but not for the EA group. One of his major findings was that the ITPA clearly differentiated the three groups on all subtests except one, and thus could be used to support clinical diagnoses.

Kass (1962) sought to discover some psychological correlates of dyslexia (severe reading disability) by using the ITPA and five supplementary tests at the automatic-sequential level. She tested 21 dyslexic children of normal intelligence who ranged in age from 7-0 to 9-11.

Analysis of Kass' results showed that these children were deficient on seven of the eight tests at the automatic-sequential level and on only one test of the six at the representational level. Thus, there seems to be a relationship between reading achievement and the automatic-sequential level of the ITPA.

Bateman (1963, a) explored the effects of visual defects on the reading and psycholinguistic processes of partially seeing children. She employed 131 subjects of normal IQ in grades one to four, all of whom were from resource rooms or special class programs for the partially seeing. She used the ITPA and the Monroe reading battery. She found that as a group, these partially seeing children read at about grade level. Like Kass, Bateman found that reading achievement was positively correlated with the automatic-sequential functions as assessed by the ITPA. From the psycholinguistic performances of the mild, moderate, and severe visual defect groups she concluded that the ITPA primarily measures central rather than peripheral processes.

Sutton (1963) attempted to determine whether a relationship between reading achievement and visualization existed. She employed two groups of 12 educable mentally retarded children matched on MA and CA. One group represented high reading achievers (i.e., reading above their MA expectancy), and the other low achievers. Each of the 24 subjects received six tests of visual memory utilizing three types of stimuli (forms, letters, and designs) and two types of responses (copying and recognition).

Sutton found that the high achievers scored significantly higher than the low achievers on tests with letter stimuli. These findings suggest that the closer a visual memory test resembles a reading task, the greater the relationship it will have with reading ability.

In a study similar to Olson's, Reichstein (1963) sought to compare the consistency of auditory threshold responses of a group of peripherally hard of hearing (HH) and a group of receptive aphasic children (RA). Both groups contained 24 children between the ages of 4-6 and 6-6. A third group of normally hearing children was also employed. The mean IQ for each of the three groups was normal.

Reichstein found that the HH group was superior to the RA group on all subtests, and in particular, on all auditory-vocal channel subtests. The normal hearing group was superior to both the experimental groups on the auditory and vocal subtests. These findings differed somewhat from Olson's. Reichstein attributed this to the age factor in that Olson's subjects were two years older.

Myers (1963) attempted a comprehensive comparison of language disabilities of 24 athetoid, 68 spastic, and 32 normal children aged 4-0 to 9-0; IQs of 80 or above; and a mental age of from 3-4 to 9-0. None of the subjects had severe visual, hearing, or speech disorders. The subjects selected were considered normal except for motor impairment. The ITPA was employed to test the major proposition that samples of subjects representing the spastic and athetoid categories of cerebral palsy differ in specific and in overall psycholinguistic abilities, not only from one another, but also from a sample of non-handicapped children of the same age.

Myers' results showed that her normal group was superior to the other two groups on overall psycholinguistic ability, and that there was no difference between the two handicapped groups on overall psycholinguistic ability. Spastics were equal to normals at the automatic-sequential level, but inferior at the representational level. Athetoids were equal to normals on three of the representational level tests and inferior on all the others. Through use of factor analysis she found that athetoids were superior to the spastics on the representational level while spastics were superior on the automatic-sequential level subtests. Myers suggested that this difference in the performance of the two groups was possibly a result of more diffuse cortical and subcortical damage in the athetoid group, in contrast to the spastic group which may have had more concentrated cortical damage. Thus, she concluded that the ITPA was an adequate instrument for separating normal, spastic, and athetoid children.

The purpose of Ferrier's (1963) study was to investigate psycholinguistic factors as they related to functional articulation disorders. He administered the ITPA and six other tests to 40 subjects, aged 6-7 to 8-7, diagnosed as having moderate to severe articulation defects. The mean IQ for the group was 98. Ferrier found that children with functional defects of articulation scored significantly below children without such defects on three ITPA subtests at the automatic-sequential level and on the auditory-vocal channel subtests at the representational level. He also determined that the ITPA profiles of children with functional articulation disorders were similar to those found in other groups of "defective children," particularly expressive aphasics. On the basis of his results, Ferrier posited two noteworthy possibilities. The first implies causal relationships between defects at the automatic-sequential level and resulting representational level problems; in order to make use of information at either level, certain automatic-sequential level operations must occur. The second suggestion implies a possible continuum leading from relatively mild articulation defects to severe expressive aphasia.

An investigation by Weaver (1963) had a dual purpose: (1) to explore psycholinguistic patterns of culturally deprived children; and (2) to evaluate the efficacy of a preschool training project in increasing their language development. Weaver selected three groups of Negro children who were part of a longitudinal research project designed to study the effects of preschool training on their intellectual functioning and personal adjustment. At the time of ITPA testing, which was 15 months after the preschool experiment commenced, his two experimental groups had received two ten-week summer training sessions plus home visits during the winter. The control group had received no special experiences other than testing.

Weaver found that both of the experimental groups were significantly higher than the control group on ITPA total score, the visual decoding, and the auditory-vocal association subtests. He also found that all three groups evidenced weaknesses on the auditory-vocal automatic (grammar) subtest. In view of the cultural deprivation of the subjects, the weakness in this subtest (significant at the .001 level) was expected, thus prompting this plea from Bateman (1964, a), "This points up the necessity for careful clinical interpretation of this subtest when the subject comes from a background other than white, middle class" (p. 23).

Jeanne McCarthy (1965) studied the psycholinguistic characteristics of 30 mongoloid and 30 non-mongoloid severely retarded children. She matched the two groups on CA, MA, and IQ. The ITPA and two supplementary tests were administered to all subjects.

McCarthy found that the mongoloids were significantly superior on motor encoding and somewhat inferior on the auditory-vocal automatic subtest. For both groups, scores at the representational level were superior to those at the automatic-sequential level. The mongoloid group showed more extreme disability areas and more extreme ability areas than the non-mongoloid group. The patterns of psycholinguistic functioning revealed a greater homogeneity among the mongoloid group than among the non-mongoloid group. McCarthy interpreted her findings to mean that the educational prognosis is more optimistic for the mongoloid group than for the non-mongoloid group.

Graubard (1965), in a study based somewhat on the design and model employed by Kass (1962), examined psycholinguistic correlates of reading disability in disturbed children. His subjects were delinquency prone, institutionalized children of normal intelligence, but retarded in reading. The mean CA of the 23 subjects was 10-0; most were Negroes. Numerous hypotheses were posited which were designed to predict how the group would perform on all aspects of Graubard's extended ITPA model. The summary of results revealed that the sample was equal to normals in the decoding, encoding, auditory-vocal sequential, and sound blending subtests. The group performed poorer than normals on the visual-motor association, auditory-vocal automatic, visual-motor sequential, mazes, and right-left discrimination subtests.

One important conclusion emanating from the Graubard study concerned the inadequate assessment usually given to children in institutional schools. Noting that the children should be evaluated with respect to perceptual strength, conflict free areas, open channels of communication, and appropriate teaching methods, Graubard stated, "Too often schools and institutions stop with an IQ classification when assessment and diagnosis is really called for. Such a global assessment of intelligence will not help to teach these children to read" (p. 83).

Bateman and Wetherell (1965) studied psycholinguistic profiles of groups of mentally retarded children in order to determine: (1) differences between these children and average children of comparable MA and CA; (2) profile differences of children of various IQ levels and diagnoses; (3) differences between performances of urban and rural low IQ children; and (4) patterns in the ITPA profile of a "typical" retarded child. The authors, after inspecting the ITPA profiles of a variety of mentally retarded samples, posited several summary conclusions among which was one more notable than the rest. This particular conclusion stated that, "There appears to be a 'typical' profile for groups of retarded children whose IQs are near or below 75. The outstanding feature is a deficit in the entire automatic-sequential level as compared to the relative strengths at the representational level" (p. 12). Thus, wherever research samples showed deficit patterns, the automatic-sequential level was involved. Sheperd's (1965) study, which compared adequate and inadequate mentally retarded readers, revealed a similar disability pattern for the total group of mentally retarded children.

An implication for the education of retarded children which grows out of Bateman and Wetherell's major conclusion rests in the great need for repetition, overlearning, and "mechanical" drill. Somewhat of an educational paradox is brought to the surface here. These authors suggest that:

> A danger inherent in current designs to make all learning situations "meaningful" to the child is that by so doing, the retarded child will handle these tasks at the representational level exclusively, thereby further strengthening his already relatively strong representational skills and neglecting the automatic-sequential areas which are in need of exercise (p. 12).

Therefore, according to Bateman and Wetherell, the effect of gearing teaching methods to the meaningful level serves to increase the cognitive, linguistic discrepancies within the child.

## Remedial studies

Kirk, Kass, and Bateman (1962) investigated the effects of an intensive and individualized remedial program upon the psycholinguistic disabilities of three selected children. Employing the case study method, the authors reported that their remediation appeared to have successfully ameliorated the areas of specific disability as well as having enhanced the overall language age.

Hermann (1962) made a psycholinguistic analysis of three siblings in a family with history of mental retardation. She then trained the psycholinguistic abilities of one sibling and one unrelated child with similar deficits in the auditory-vocal channel, in particular, auditory-vocal automatic (grammar) disabilities. Both subjects receiving remedial treatment in this area showed significant gains; however, the controls (i.e., the non-treatment siblings) also made significant gains in some psycholinguistic areas. Bateman (1964, a) noted that some of the remedial activities employed were indistinguishable from the test items.

Smith (1962) sought to evaluate the effects of a group language development program with a small group of educable mentally retarded (EMR) children. He hypothesized that: (1) A systematic language program would significantly enhance the total language age (LA) scores; (2) IQ level would be unrelated to gains in ITPA total LA scores; and (3) Initial LA level would be unrelated to gain in total LA score. The sixteen pairs of children who served as subjects were matched on CA (seven to ten years), and ITPA total LA score. All subjects had Stanford Binet IQs between 50 and 80, were from special classes in the public schools, and were free of visual, hearing, and physical defects. The experimental groups received training for 11 weeks in groups of eight for three weekly periods of 45 minutes each. The controls received no treatment, other than remaining in the EMR classroom. In contrast to individualized, specific remediation as reported in the Kirk, et al. (1962) study noted above, Smith's program was rather global, geared toward increasing the children's decoding, associating, and encoding linguistic symbols.

Smith reported that the experimental group improved in each of the nine ITPA subtests. Thirteen of the 16 experimental children showed LA gains greater than their matched controls; and highly significant differences (.001) existed between the two groups on total LA at the conclusion of the study.

The results of Smith's study showed that his short-term, global, and developmental approach was significantly effective. Interestingly, however, Mueller and Smith (1964) followed up these same subjects a year later only to discover that there were no longer significant differences between the two groups on the ITPA. Thus, this finding is consistent with Balow's (1965) assertion, noted previously, that gains made after short-term remediation usually diminish on follow-up investigation. Furthermore, support for the attention factor (Lovell, et al., 1963) as an accomplice to gains is also evident.

Blue (1963), in a study similar to Smith's, investigated the immediate effect of a language development program on 24 trainable mentally retarded children. The subjects were matched on CA and total LA. The experimental group, subdivided into two groups by CA, received language teaching for 11 weeks in group sessions. Although the difference was not significant, the results favored the experimental group and this was interpreted as support for such a program for TMR children. Of particular interest were the great gains made by the younger over the older groups in both the experimental and control groups. This suggests that age, rather than the training program, may have been a major factor affecting ITPA posttest scores.

Employing the ITPA visual-motor sequential subtest as one of four tests, Hirsch (1963) tested the hypothesis that the kinesthetic method of teaching reading with meaningful material develops sequential visualizing ability with non-meaningful material. Her subjects were 14 non-reading, educable mentally retarded children, matched on mean scores of the four tests. The experimental group received 20 days of training in the Fernald kinesthetic method, and obtained significantly (.05) higher total change scores than did the non-trained control group. Here again, the question of attention arises. With absence of a control group for attention, one cannot positively assume that the experimental treatment was the sole cause of gains.

Hart (1963) hypothesized that: (1) a systematic language development program adjusted to the specific deficits of cerebral palsied children would significantly enhance their total language age scores as measured by the ITPA; and (2) as a result of this language program, the experimental group would make more progress in reading than the control group. Hart used nine matched pairs of second graders at a school for spastic children in Australia. Language remediation lasted seven weeks and was aimed at developing ability to decode, associate, and encode linguistic symbols. The results revealed that both hypotheses were confirmed in favor of the experimental group, suggesting that a short-term program of language remediation can be successful with this population. Nevertheless, the problems of attention and retention (or gains) remain as discussed in some of the studies above.

Wiseman (1965, b) attempted to determine the effects of specific remediation on the psycholinguistic disabilities of educable mentally retarded boys. His study also sought to answer three questions: (1) the extent to which performance in psycholinguistic abilities would be modified by remediation; (2) the extent to which nondisability areas might be influenced by remediation of disability areas; and (3) the influence special treatment would have on other cognitive or perceptual abilities. Wiseman employed a matched pair design in which ten boys received specific remedial training and ten did not. The subjects were paired primarily on psycholinguistic disability areas, although CA (from 6-6 to 11-7), MA, and mean LA were also considered in the matching process. In addition to the ITPA, the Stanford-Binet, the Frostig Visual Perception, the Developmental Forms Sequence, and the Kass Visual Closure tests were administered. The children in the experimental group were individually tutored for a total of 60 half-hour sessions.

Analysis of Wiseman's data revealed that the remediation had a positive, significant effect on the experimental group. This group exceeded the controls in mean LA gain (.05); on eight of the nine ITPA subtests (.02); and when compared on disability areas, (.005). The author also found that the subtests at the automatic-sequential level seemed to show significantly (.001) more instances of disability than subtests at the representational level, thus lending further support to the findings of Bateman and Wetherell (1965). On the supplementary tests of perceptual and intellectual ability, the results generally favored the experimental group with the notable exception of four of the five Frostig subtests.

There are many commendable aspects to Wiseman's study, particularly, his realistic, critical appraisal of one of the study's main weaknesses, the need for a third group of subjects to offset the "experimenter effect." Of special value is the comprehensive organization of specific remedial methods outlined in conjunction with specific psycholinguistic disability areas. This material, in combination with Wiseman's (1965, a) classroom procedure for identifying and treating language difficulties provide a much needed system upon which special education may build those remedial programs necessary to suit the treatment to the disability as well as the individual needs of the child.

## Summary of Background Information

The following summary accounts for some of the major points relevant to this study.

1. Investigators are increasingly in agreement that the mentally retarded-emotionally disturbed population is

grossly heterogeneous. Systematic educational differential diagnosis, on an individual basis, is long overdue.

2. An approach to remediation and a method of remediation were not viewed as synonymous. The former constitutes an entire diagnostic-remedial plan which incorporates one or many methods within its remedial scope. Particular methods or techniques of remediation are not necessarily exclusive to one approach or another, but can, and should be employed on the basis of problems symptomatic of true learning disabilities.

3. It seems reasonable to assume that the adoption of a learning disabilities approach to the diagnostic-remedial process (e.g., psycholinguistic approach) will provide a more meaningful and comprehensive program for the amelioration of language or any other learning disabilities among all types of children. Non-specific or global approaches do not appear to focus on the appropriate symptoms of learning disorders; hence, inappropriate remediation results.

4. Most educational and remediational studies have not controlled the attention factor in their respective designs. The possibility exists that significant gain scores obtained in some studies which deal with pre- and post-remedial measurement have been more a fact of attention to the experimental group involved rather than the actual experimental treatment involved. One step toward relieving this possible variable is to include a third control group in the design of the study.

5. Consistent in the research with the mentally retarded was the finding that performance on the automatic-sequential level subtests of the ITPA was generally inferior to the subtests of the representational level. It has been strongly posited that primary deficits at the automatic-sequential level may underlie other deficiencies; and that reading is dependent on automatic-sequential functions as assessed by the ITPA. It was

suggested, therefore, that it is the repetitious, mechanical, non-meaningful, and memory skills which must be built up in the retarded.

6. The ITPA has demonstrated value as an important instrument in differential diagnosis of language and other learning disabilities. Furthermore, the ITPA has been used productively with many exceptionalities (e.g., mental retardation, cerebral palsy, hard of hearing) to explore psycholinguistic problems as well as the effects of remedial training.

## Objectives of the Study

### Hypotheses related to description of sample

In view of the paucity of literature pertaining to the learning characteristics of the present sample of mentally retarded-emotionally disturbed children, it does not seem practical to predict or hypothesize such characteristics without risking the loss of important information. However, to the extent that subjects studied by Bateman and Wetherell (1965) approximate the present sample, it was possible to hypothesize specific characteristics in terms of what they found for mentally retarded populations, and which the literature has shown to be a somewhat consistent finding. Consequently, it was predicted in HYPOTHESIS I that the children in the present sample will show learning characteristics similar to those found by Bateman and Wetherell. On the basis of their findings with the ITPA, they proposed that the mentally retarded have a deficit at the automatic-sequential level. Thus, the following sub-hypotheses were directly derived from Bateman and Wetherell's findings. HYPOTHESIS Ia: This group will perform significantly below its expected level on the three automatic-sequential level subtests of the ITPA.

Based on Bateman and Wetherell's conclusion that the mentally retarded show deficits at the automatic-sequential level, the following sub-hypothesis was extrapolated in view of the extended ITPA model employed in this investigation: HYPOTHESIS Ib. This group will perform significantly below its expected level on the following tests at the automatic-sequential level: the five Frostig subtests, the Monroe Sound Blending, the Wepman Auditory Discrimination Test, and Kass' Visual Closure Test.

Since Bateman and Wetherell also found that the subjects surveyed by them performed adequately on all tests at the representational level except the motor encoding subtest of the ITPA, the following sub-hypothesis was generated: HYPOTHESIS Ic. This group will perform at about its expected level on the representational level of the ITPA with the exception of the motor encoding test on which it will perform significantly below its expected level.

## Hypothesis related to remediation

Since a major purpose of this study was to test the effectiveness of a psycholinguistic approach to diagnosis and remediation by comparing it to a more conventional approach to remediation, HYPOTHESIS II predicted: the experimental treatment group will show significantly greater improvement from diagnostic pretest scores to posttest scores than the comparison treatment group and the non-treatment group, while the comparison treatment group will show significantly more improvement than the non-treatment control group.

# CHAPTER III

# METHOD

In this chapter the following areas are described: subjects, measuring instruments, procedures, and methods of evaluation.

## Subjects

Thirty-two mentally retarded-emotionally disturbed children comprised the descriptive sample of this study. From this group, 15 subjects (_S_s) were screened for participation in the remediation aspect of the study.

The sample of 32 _S_s represented the younger half of the population in the Edenwald School, a coeducational, residential treatment center operated by the Jewish Child Care Association in the Bronx, New York in affiliation with Albert Einstein College of Medicine. The Edenwald School houses approximately 65 children diagnosed as mentally retarded and emotionally disturbed, and who are between the ages of eight and eighteen years. Children are referred to the Edenwald School who, in addition to mild mental retardation, suffer some type or degree of emotional or personality disorder. In some cases the family relationships are wholly pathological and disorganized; in others, it is the child's own emotional disturbance which determines his separation from the home and community. In all cases eligibility for placement was determined by a complete psychiatric, social, pediatric, and psychological evaluation and diagnosis.

The children attend classes which are part of the special services of a New York City public school operated on the Edenwald campus. In and out of school hours they are supervised, taught, or treated by staff psychiatrists, psychologists, remedial reading teachers, a remedial speech and language instructor, social caseworkers, and a number of other personnel ranging from recreation specialists to kitchen staff.

Table 1 presents a description of the group of 32 Ss in terms of CA, MA, IQ, and months in residence. Mental age and IQ scores were derived from the Stanford-Binet Intelligence Scale (Form L-M) administered in the screening battery. The chronological ages of these Ss ranged from 8-4 to 15-9 with a mean CA of 12-6. Mental ages ranged from 4-11 to 10-6 with a mean MA of 7-4. The range of IQs was from 50 to 80 with a mean of 61.3. The upper IQ limit of 80 was attributed to a single S eventually excluded in the screening for the smaller remedial sample. Time in residence is shown in Table 1. This ranged from 1 to 64 months with a mean residence of 14 months. The Edenwald School population consists of approximately two-thirds males and one-third females. For the 32 Ss in the descriptive sample, however, the ratio consisted of 18 males and 14 females.

In examining the profiles obtained by the 32 Ss on the screening (i.e., pretest) battery, 15 Ss were clinically identified and matched into triads on the basis of observed psycholinguistic weaknesses and strengths. The Ss in each triad were then randomly assigned to one of the following groups:

(1) an experimental treatment group (A) which received remediation by the investigator based on each S's respective learning disabilities (i.e., psycholinguistic profile);
(2) a comparison treatment group (B) which received remediation by remedial teachers on the staff at the Edenwald School; and
(3) a non-treatment control group (C) which received no remediation.

### CA, MA, IQ, and Months in Residence of Total Sample (N = 32)

| Subject Number | CA | MA | IQ | Months in Residence |
|---|---|---|---|---|
| 1 | 171 | 81 | 52 | 34 |
| 2 | 126 | 62 | 51 | 17 |
| 3 | 183 | 96 | 57 | 19 |
| 4 | 147 | 84 | 61 | 28 |
| 5 | 173 | 93 | 59 | 32 |
| 6 | 189 | 93 | 52 | 5 |
| 7 | 167 | 99 | 63 | 26 |
| 8 | 189 | 126 | 70 | 9 |
| 9 | 129 | 74 | 59 | 19 |
| 10 | 169 | 108 | 68 | 26 |
| 11 | 144 | 105 | 75 | 25 |
| 12 | 171 | 114 | 70 | 21 |
| 13 | 100 | 59 | 57 | 5 |
| 14 | 132 | 78 | 61 | 1 |
| 15 | 177 | 102 | 62 | 37 |
| 16 | 157 | 123 | 80 | 9 |
| 17 | 113 | 75 | 65 | 3 |
| 18 | 161 | 99 | 65 | 16 |
| 19 | 130 | 81 | 64 | 34 |
| 20 | 181 | 81 | 50 | 19 |
| 21 | 125 | 96 | 76 | 1 |
| 22 | 124 | 71 | 58 | 3 |
| 23 | 122 | 66 | 54 | 26 |
| 24 | 130 | 66 | 53 | 22 |
| 25 | 161 | 93 | 62 | 64 |
| 26 | 154 | 102 | 69 | 4 |
| 27 | 160 | 93 | 62 | 8 |
| 28 | 153 | 90 | 62 | 15 |
| 29 | 156 | 102 | 68 | 30 |
| 30 | 169 | 78 | 51 | 44 |
| 31 | 134 | 69 | 54 | 31 |
| 32 | 130 | 63 | 51 | 16 |
| $\overline{X}$ | 150.81 | 88.18 | 61.28 | 20.28 |
| SD | 23.69 | 17.58 | 7.92 | 14.16 |

Table 2 depicts the relevant background data (i.e., CA, MA, IQ, and months in residence) for these three subgroups shown as matched triads. Case numbers representing each S's group and matched mates were employed (e.g., A-1, B-1, and C-1 depict the first matched triad, while A-1 through A-5 represent the experimental group). Although such designations may appear more impersonal than the use of Ss' initials or first names, they have the advantage of easy recognition of group membership for each S.

It is important to note that the triads were not matched on the characteristics presented in Table 2. It was necessary to forego matching on these variables in order to employ as the criterion for matching the similarity of diagnostic profiles between Ss, thus emphasizing the learning disabilities approach to diagnosis. Specifically, each triad was matched on comparable disabilities which differed from triad to triad. For example, one triad presented a visual-motor association problem while another triad showed an encoding deficit. Usually one or at the most two disabilities could be selected for remedial attention. Wherever possible, Ss were matched on strengths as well as weaknesses. Figures 3, 4, 5, 6, and 7 present the profiles of the five matched triads on the basis of the entire pretest battery. For additional clarity, Tables 3, 4, 5, 6, and 7 compare the Ss in each triad on the basis of the language ages obtained on the various subtests. It is important to note that Ss were not matched on these absolute language ages; rather they were matched in relation to their respective mean language ages on the basis of their own profiles.

The Ss shown in Fig. 3 were matched on the basis of their deficit in visual-motor sequencing. In addition to this disability area, S A-1 was tutored for her deficit in sound blending. In terms of apparent strengths of Ss in this triad, auditory decoding appeared as the obvious

## Table 2

## Comparison of Matched Triads on C.A., M.A., I.Q., and Months in Residence

| Group | Case Number | C.A. | M.A. | I.Q. | Months in Residence |
|---|---|---|---|---|---|
| Group A | 1 | 132 | 78 | 61 | 1 |
| | 2 | 124 | 71 | 58 | 3 |
| | 3 | 122 | 66 | 54 | 26 |
| | 4 | 161 | 93 | 62 | 64 |
| | 5 | 169 | 78 | 51 | 44 |
| | $\bar{X}$ | 141.60 | 77.20 | 57.20 | 27.60 |
| | S.D. | 21.87 | 10.18 | 4.66 | 26.97 |
| Group B | 1 | 189 | 126 | 70 | 9 |
| | 2 | 173 | 93 | 59 | 32 |
| | 3 | 130 | 63 | 51 | 16 |
| | 4 | 171 | 81 | 52 | 34 |
| | 5 | 169 | 108 | 68 | 26 |
| | $\bar{X}$ | 166.40 | 94.20 | 60.00 | 23.40 |
| | S.D. | 21.83 | 24.24 | 8.80 | 10.67 |
| Group C | 1 | 171 | 114 | 70 | 21 |
| | 2 | 113 | 75 | 65 | 3 |
| | 3 | 182 | 96 | 57 | 19 |
| | 4 | 177 | 102 | 62 | 37 |
| | 5 | 189 | 93 | 52 | 5 |
| | $\bar{X}$ | 166.40 | 96.00 | 61.20 | 17.00 |
| | S.D. | 30.57 | 14.23 | 6.98 | 13.78 |

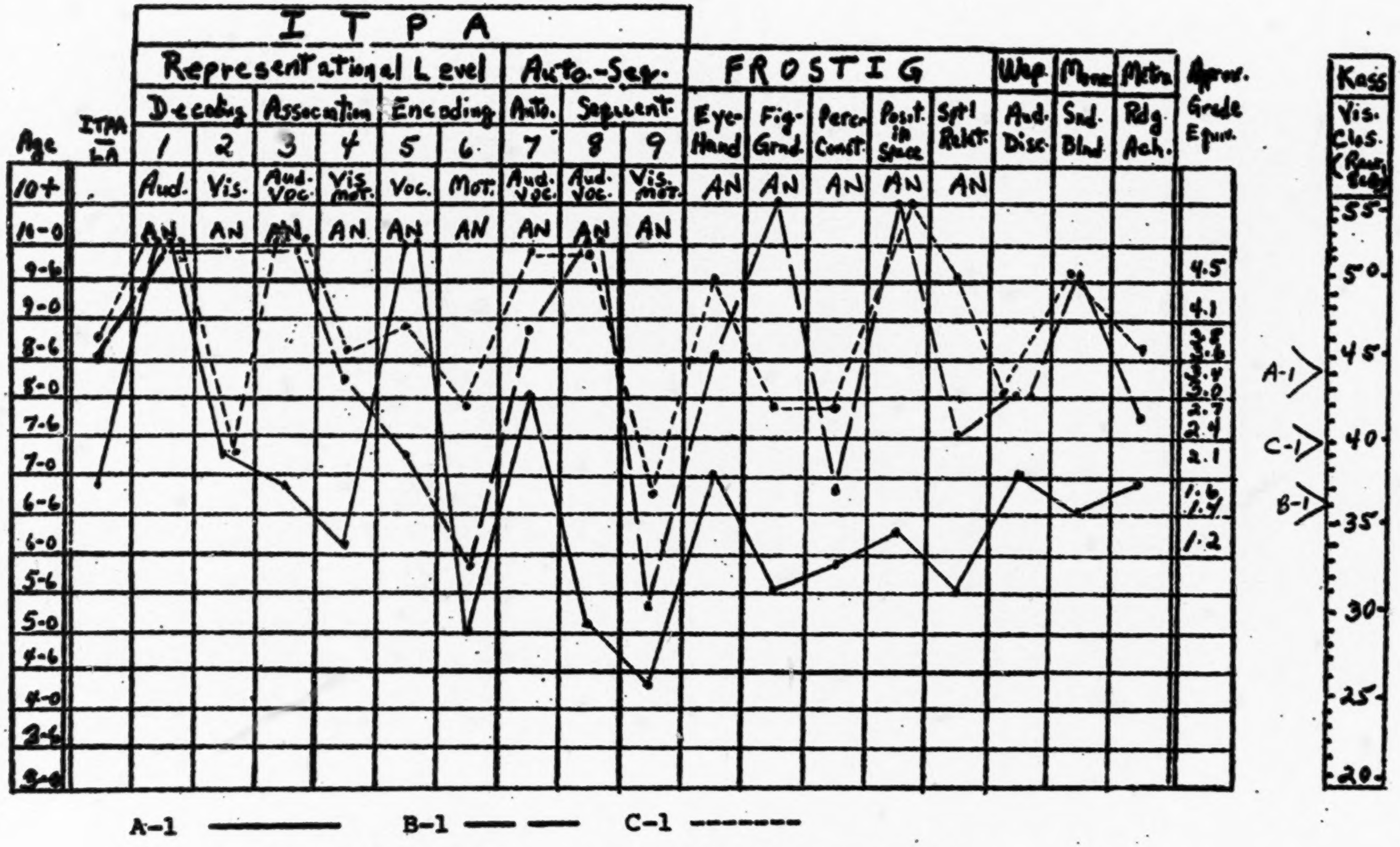


Fig. 3 .Comparison of A-1, B-1, and C-1 on pre-test. Matched on visual motor sequencing deficit.

## Table 3

## Comparison of Language Ages for A-1, B-1, and C-1 on Pretest. Matched on Visual-motor Sequencing Deficit.

| Subtest | Subject | | |
|---|---|---|---|
| | A-1 | B-1 | C-1 |
| ITPA | | | |
| Auditory Decoding | AN[a] | AN | AN |
| Visual Decoding | 7-3 | AN | 7-3 |
| Auditory-vocal Association | 6-10 | AN | AN |
| Visual-motor Association | 6-1 | 8-3 | 8-7 |
| Vocal Encoding | AN | 7-4 | 8-11 |
| Motor Encoding | 5-0 | 5-10 | 7-11 |
| Auditory-vocal Automatic | 8-0 | 8-0 | 9-6 |
| Auditory-vocal Sequential | 5-1 | AN | AN |
| Visual-motor Sequential | 4-4 | 5-4 | 6-9 |
| Frostig | | | |
| Eye-hand Coordination | 7-0 | 8-6 | 9-6 |
| Figure-ground Perception | 5-6 | AN | 7-9 |
| Perceptual-shape Constancy | 5-9 | 6-9 | 7-9 |
| Position in Space | 6-3 | AN | AN |
| Spatial Relationships | 5-6 | 7-6 | 9-6 |
| Auditory Discrimination | 7-0 | 9-0 | 8-9 |
| Sound Blending | 6-5 | 9-6 | 9-6 |
| Reading Achievement | 6-8 | 7-7 | 8-7 |
| Visual Closure[b] | 44 | 36 | 40 |
| | | | |
| Mean Language Age | 6-9 | 8-6 | 8-9 |

[a] AN refers to above norms scores.

[b] Since language ages are not available for this test, raw scores were used.

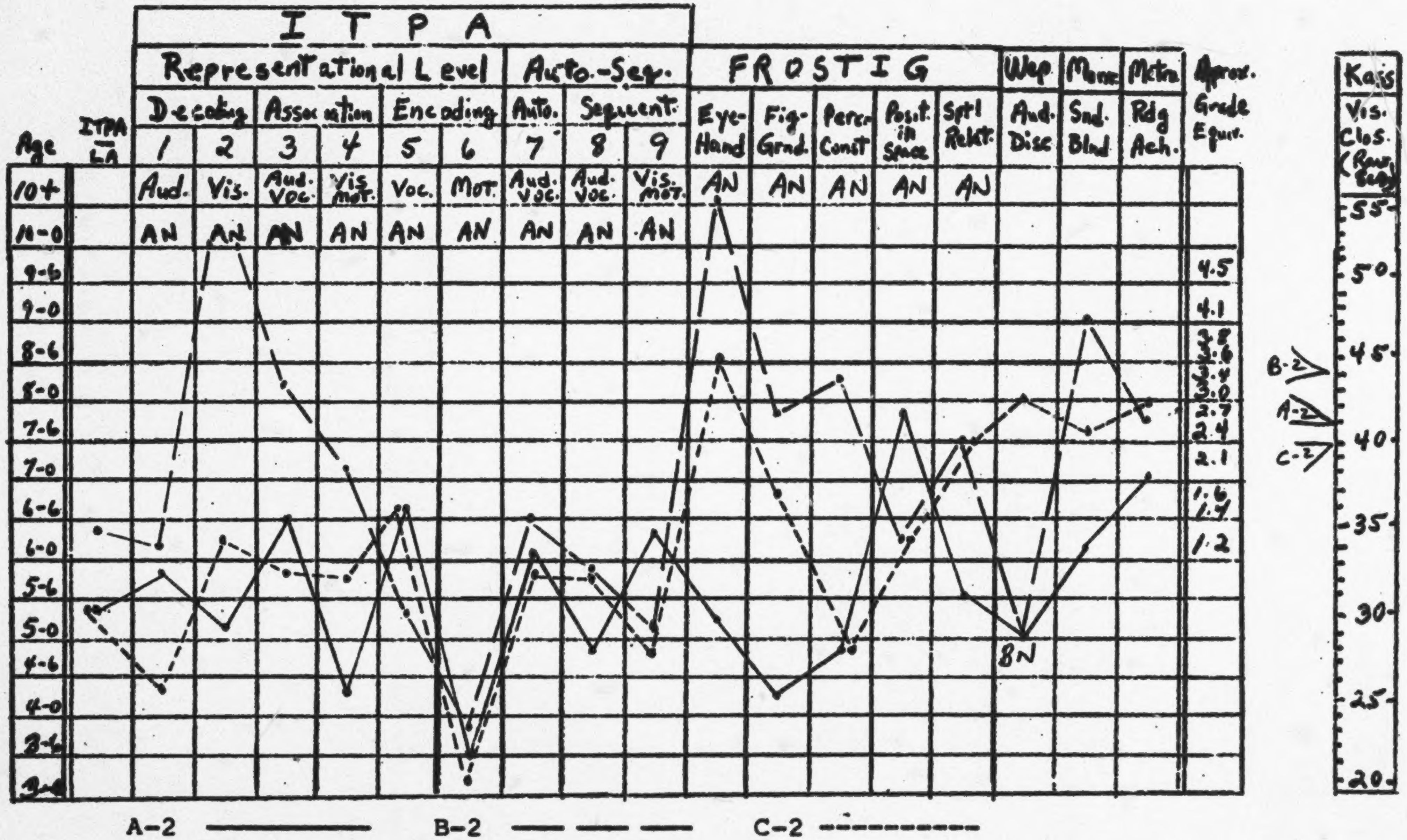


Fig. 4. Comparison of A-2, B-2, and C-2 on pre-test. Matched on motor encoding deficit.

Table 4

Comparison of Language Ages for A-2, B-2, and C-2 on Pretest. Matched on Motor Encoding Deficit.

| Subtest | Subject | | |
|---|---|---|---|
| | A-2 | B-2 | C-2 |
| ITPA | | | |
| Auditory Decoding | 5-8 | 6-2 | 4-5 |
| Visual Decoding | 5-2 | AN[a] | 6-3 |
| Auditory-vocal Association | 6-6 | 8-3 | 5-10 |
| Visual-motor Association | 4-4 | 7-2 | 5-9 |
| Vocal Encoding | 6-7 | 5-4 | 6-7 |
| Motor Encoding | 3-6 | 3-10 | 3-2 |
| Auditory-vocal Automatic | 6-1 | 6-6 | 5-9 |
| Auditory-vocal Sequential | 4-10 | 5-11 | 5-11 |
| Visual-motor Sequential | 6-4 | 5-1 | 4-10 |
| Frostig | | | |
| Eye-hand Coordination | 5-3 | AN | 8-6 |
| Figure-ground Perception | 4-3 | 7-9 | 6-9 |
| Perceptual-shape Constancy | 4-9 | 8-3 | 4-9 |
| Position in Space | 7-9 | 6-3 | 6-3 |
| Spatial Relationships | 5-6 | 7-6 | 7-6 |
| Auditory Discrimination | 5-0 | 5-0 | 8-0 |
| Sound Blending | 6-3 | 9-2 | 7-5 |
| Reading Achievement | 7-1 | 7-6 | 7-10 |
| Visual Closure[b] | 41 | 44 | 40 |
| Mean Language Age | 5-5 | 6-5 | 5-5 |

[a] AN refers to above norms scores.

[b] Since language ages are not available for this test, raw scores were used.

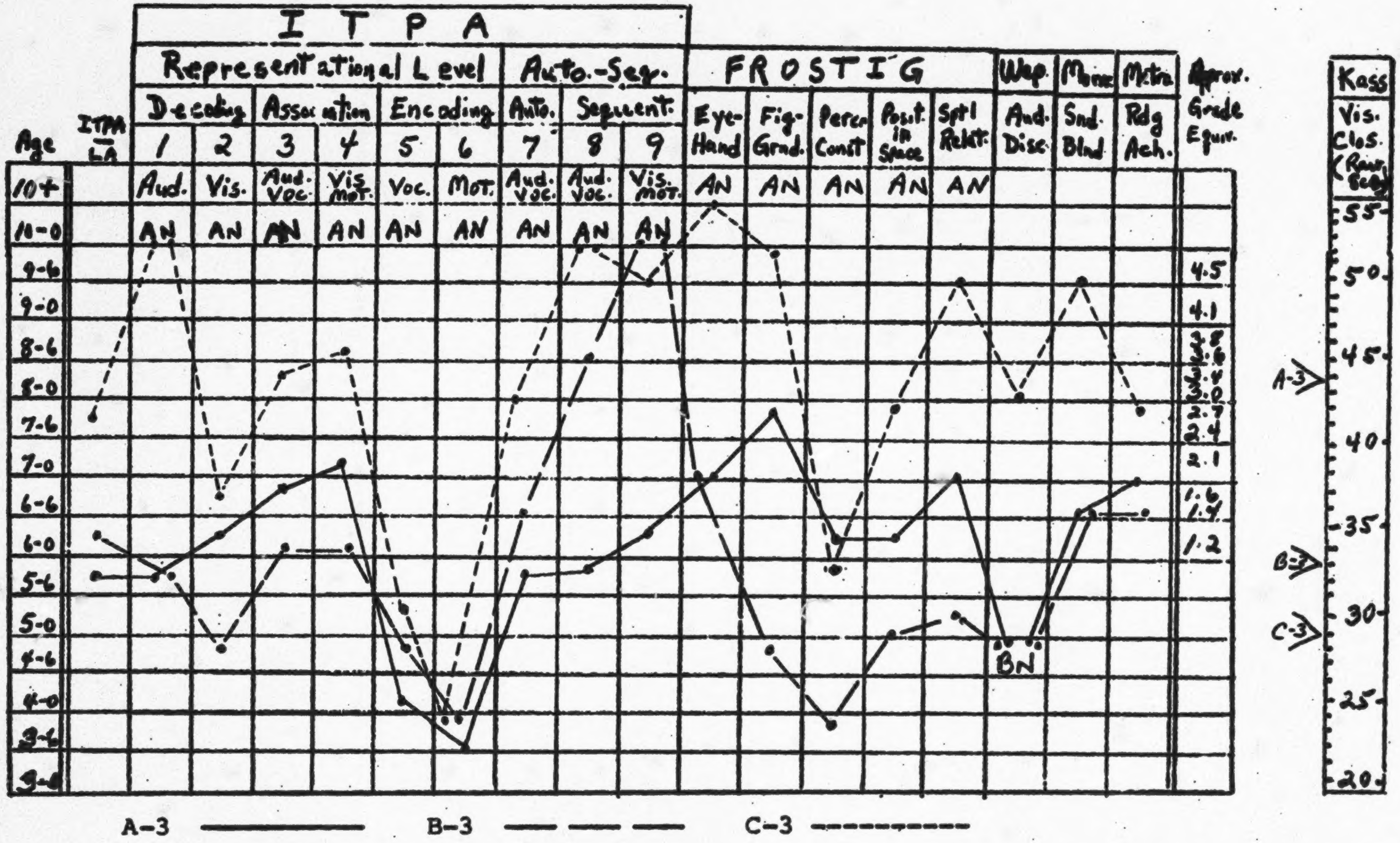


Fig. 5. Comparison of A-3, B-3, and C-3 on pre-test. Matched on vocal and motor encoding deficits.

### Table 5

### Comparison of Language Ages for A-3, B-3, and C-3 on Pretest. Matched on Vocal and Motor Encoding Deficits.

| Subtest | Subject | | |
|---|---|---|---|
| | A-3 | B-3 | C-3 |
| ITPA | | | |
| Auditory Decoding | 5-8 | 5-8 | AN |
| Visual Decoding | 6-3 | 4-9 | 6-8 |
| Auditory-vocal Association | 6-10 | 6-1 | 8-3 |
| Visual-motor Association | 7-2 | 6-1 | 8-7 |
| Vocal Encoding | 4-1 | 4-9 | 5-4 |
| Motor Encoding | 3-6 | 3-10 | 3-10 |
| Auditory-vocal Automatic | 5-9 | 6-6 | 8-0 |
| Auditory-vocal Sequential | 5-11 | 8-6 | AN |
| Visual-motor Sequential | 6-4 | AN[a] | 9-0 |
| Frostig | | | |
| Eye-hand Coordination | 7-0 | 7-0 | AN |
| Figure-ground Perception | 7-9 | 4-9 | 9-9 |
| Perceptual-shape Constancy | 6-3 | 3-9 | 5-9 |
| Position in Space | 6-3 | 5-0 | 7-9 |
| Spatial Relationships | 7-6 | 5-3 | 9-6 |
| Auditory Discrimination | 4-0 | 4-0 | 8-0 |
| Sound Blending | 6-5 | 6-5 | 9-6 |
| Reading Achievement | 6-11 | 6-5 | 7-8 |
| Visual Closure[b] | 44 | 33 | 29 |
| Mean Language Age | 5-9 | 6-3 | 7-8 |

[a] AN refers to above norms scores.

[b] Since language ages are not available for this test, raw scores were used.

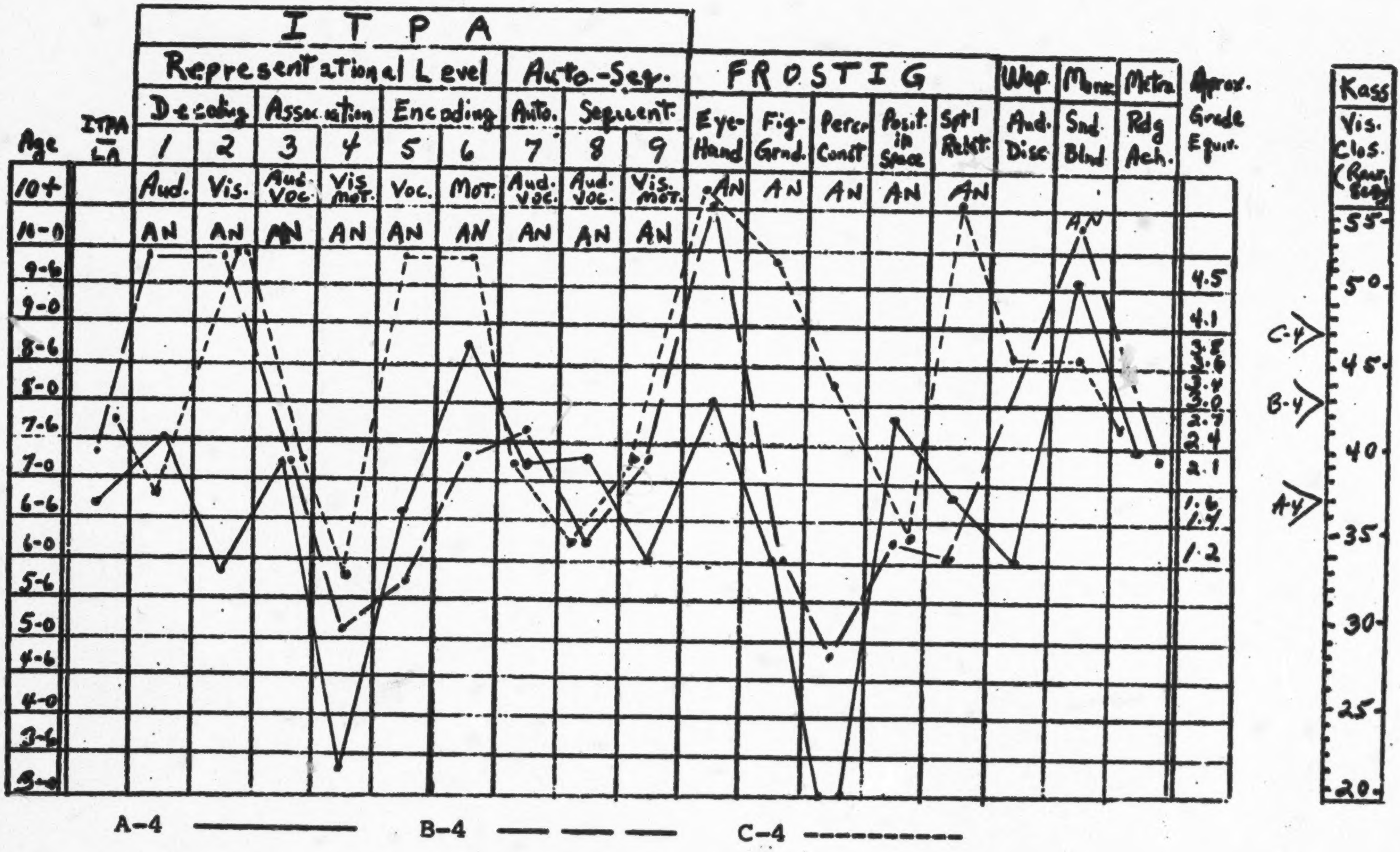


Fig. 6. Comparison of A-4, B-4, and C-4 on pre-test. Matched on visual-motor association deficit.

## Table 6

## Comparison of Language Ages for A-4, B-4, and C-4 on Pretest. Matched on Visual-motor Association Deficit

| Subtest | Subject |  |  |
|---|---|---|---|
|  | A-4 | B-4 | C-4 |
| ITPA |  |  |  |
| Auditory Decoding | 7-6 | AN[a] | 6-9 |
| Visual Decoding | 5-10 | AN | AN |
| Auditory-vocal Association | 7-3 | 7-3 | 7-3 |
| Visual-motor Association | 3-4 | 5-1 | 5-9 |
| Vocal Encoding | 6-7 | 5-8 | AN |
| Motor Encoding | 8-8 | 7-4 | AN |
| Auditory-vocal Automatic | 7-3 | 7-7 | 7-3 |
| Auditory-vocal Sequential | 7-4 | 6-3 | 6-3 |
| Visual-motor Sequential | 6-0 | 7-4 | 7-4 |
| Frostig |  |  |  |
| Eye-hand Coordination | 8-0 | 9-6 | AN |
| Figure-ground Perception | 6-0 | 6-0 | 9-9 |
| Perceptual-shape Constancy | 2-9 | 4-9 | 8-3 |
| Position in Space | 7-9 | 6-3 | 6-3 |
| Spatial Relationships | 6-9 | 6-0 | AN |
| Auditory Discrimination | 6-0 | 6-0 | 9-0 |
| Sound Blending | 9-6 | 9-10 | 8-7 |
| Reading Achievement | 7-3 | 7-2 | 7-6 |
| Visual Closure[b] | 37 | 43 | 47 |
| Mean Language Age | 6-8 | 7-4 | 7-9 |

[a] AN refers to above norms scores.

[b] Since language ages are not available for this test, raw scores were used.

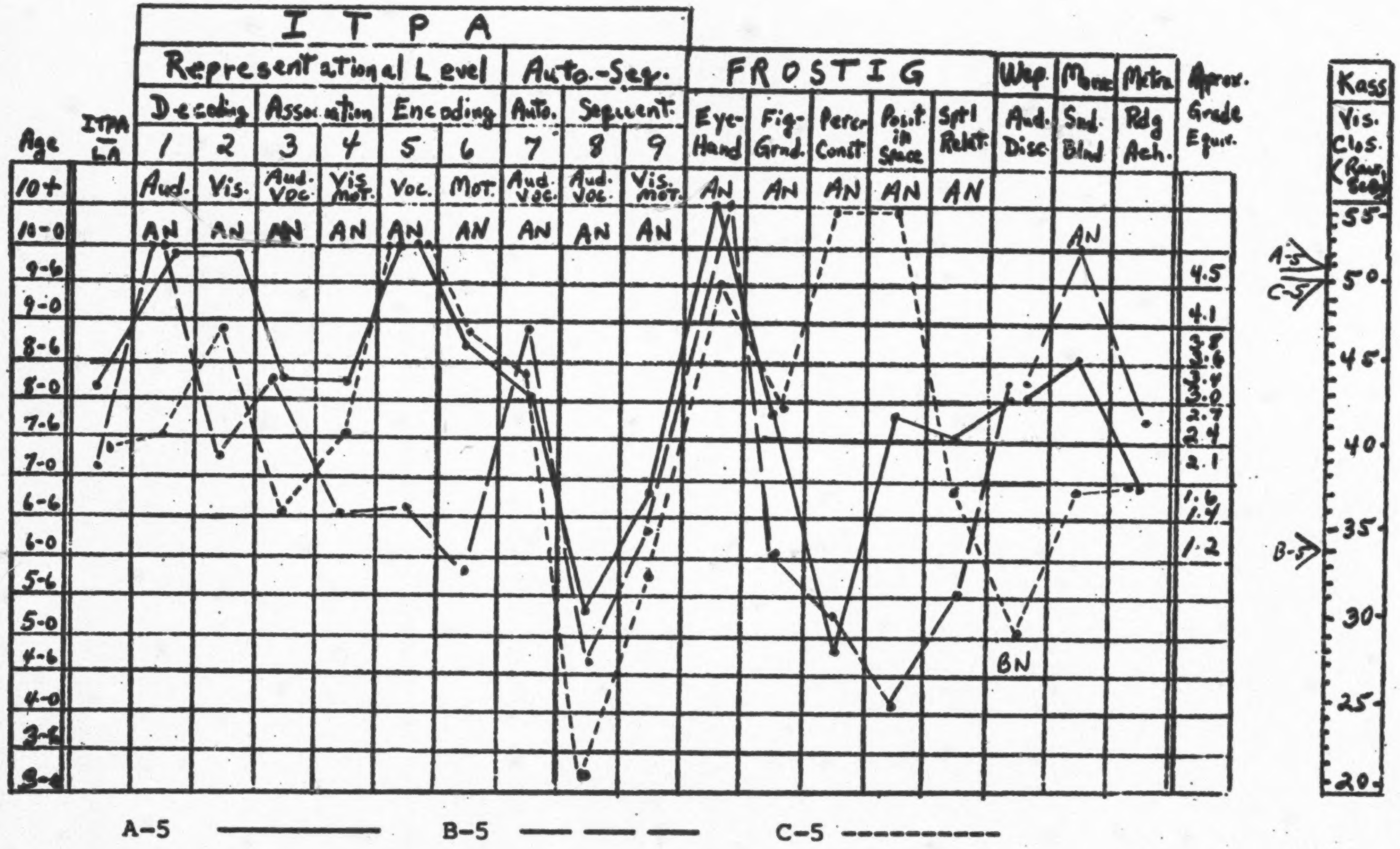


Fig. 7. Comparison of A-5, B-5, and C-5 on pre-test. Matched on auditory-vocal sequencing deficit.

## Table 7

## Comparison of Language Ages for A-5, B-5, and C-5 on Pretest. Matched on Auditory-vocal Sequencing Deficit.

| Subtest | Subject A-5 | Subject B-5 | Subject C-5 |
|---|---|---|---|
| ITPA | | | |
| Auditory Decoding | AN[a] | AN | 7-6 |
| Visual Decoding | AN | 7-3 | 8-9 |
| Auditory-vocal Association | 8-3 | 8-3 | 6-6 |
| Visual-motor Association | 8-3 | 6-6 | 7-6 |
| Vocal Encoding | AN | 6-7 | AN |
| Motor Encoding | 8-8 | 5-10 | 8-8 |
| Auditory-vocal Automatic | 8-0 | 8-9 | 8-4 |
| Auditory-vocal Sequential | 5-4 | 4-7 | 3-3 |
| Visual-motor Sequential | 6-9 | 6-4 | 5-8 |
| Frostig | | | |
| Eye-hand Coordination | AN | AN | 9-6 |
| Figure-ground Perception | 7-9 | 6-0 | 7-9 |
| Perceptual-shape Constancy | 4-9 | 5-3 | AN |
| Position in Space | 7-9 | 4-0 | AN |
| Spatial Relationships | 7-6 | 5-6 | 6-9 |
| Auditory Discrimination | 9-0 | 9-0 | 5-0 |
| Sound Blending | 8-7 | 10-3 | 6-7 |
| Reading Achievement | 6-10 | 7-6 | 6-8 |
| Visual Closure[b] | 51 | 34 | 50 |
| Mean Language Age | 8-2 | 7-1 | 7-4 |

[a] AN refers to above norms scores.

[b] Since language ages are not available for this test, raw scores were used.

commonality for all three Ss, with the auditory-vocal channel presented as a prominent ability area for Ss B-1 and C-1 in particular.

Figure 4 shows that motor encoding was the deficit upon which the three Ss in the second triad were matched. As for matching on ability areas, this could not be done with facility for this triad in that there was no consistency in the strengths shown from profile to profile.

The prominent disability area depicted in Fig. 5 is encoding, both vocal and motor. Common to this triad was evidence of strength in memory (i.e., sequencing). Although S A-3 was lower in the sequencing areas than were the other two Ss, she was somewhat stronger in these areas than was evident, her sequencing scores being slightly higher than her mean language age ($\overline{LA}$).

Figure 6 pictures triad number four which was matched on a visual-motor association disability. It will be noted that two of the Ss, A-4 and B-4, also showed deficits in the perceptual constancy subtest of the Frostig test. Remediation of S A-4 was geared toward ameliorating both of these disabilities. Strength in the area of visual decoding was found common to Ss B-4 and C-4. All three members of this triad were relatively high on eye-hand coordination and sound blending.

As shown in Fig. 7, auditory-vocal sequencing was the disability on which this triad was matched. Perceptual constancy was also found to be a deficit common to Ss A-5 and B-5. Both of these deficit areas were the focus of treatment with A-5. In terms of ability areas, there was commonality in the areas of visual decoding, vocal encoding, and visual closure for A-5 and C-5. All three Ss showed strengths in the Frostig eye hand coordination subtest.

In summary, the disability areas on which the Ss were primarily matched were as follows:

triad 1 - visual-motor sequencing
triad 2 - motor encoding

triad 3 - vocal and motor encoding
triad 4 - visual-motor association
triad 5 - auditory-vocal sequencing.

## Measuring Instruments

All _S_s received a diagnostic battery consisting of the following tests: (a) the Stanford-Binet Intelligence Scale, Form L-M (Terman and Merrill, 1960); (b) the reading test of the Metropolitan Achievement Battery (1960); (c) the Illinois Test of Psycholinguistic Abilities (McCarthy and Kirk, 1961); (d) the Sound Blending Test from the Monroe Diagnostic Reading Examination (1932); (e) the Visual Closure Test (Kass, 1962); (f) the Auditory Discrimination Test (Wepman, 1958); and the Developmental Test of Visual Perception (Frostig, 1961). Except for the Stanford-Binet and the reading test, the psycholinguistic model (Fig. 2) presented in the preceding chapter accounts for the relevance of each of the diagnostic instruments in the study.

The following is a description of all the tests administered:

(a) _The Stanford-Binet Intelligence Scale, Form L-M_. This is the third revision of the instrument and it combines into one scale up-to-date content and basic characteristics of the previous revisions. Generally accepted as providing a reliable and valid measure of IQ and MA, it was employed in this investigation for the purpose of ascertaining the current intellectual status of the sample.

(b) _The Metropolitan Achievement Test_. The reading test of either the primary or elementary batteries was employed, depending upon respective reading status of each _S_ as reported in the school's cumulative files. Form C was administered in the initial battery; the equivalent Form B was given in the posttesting. The Metropolitan Achievement Battery provides an average reading score which was used in this study as an informal check to see if reading grade was incidentally affected by remediation.

(c) The Illinois Test of Psycholinguistic Abilities. A discussion of the ITPA and its theoretical base has been presented in the previous chapter. The ITPA is a diagnostic test (Kirk and McCarthy, 1961) containing nine subtests designed for use with children between the ages of two and one-half and nine. Justification for its use with some of the older children in the present study is seen in the atypical nature of the sample and the precedents set by McCarthy and Kirk (1961), Graubard (1965), and Wiseman (1965, b).

Although few diagnostic validity studies have been performed, McCarthy and Olson (1964) maintain that there are sufficient clues in ITPA profiles to permit judgments in differential diagnosis " . . . well beyond the level of chance" (p. 61).

Overall reliability of the ITPA based on split-half reliability coefficients is reported as .99 by McCarthy and Kirk (1963). Overall split-half reliability coefficients for all ages by each subtest range from .90 to .96.

Since $\overline{\text{LA}}$s were employed in determining both individual and group expectancy levels in this investigation, the process of extrapolation was used where ITPA subtest scores were above the norms provided in the scoring manual.

Listed below is a brief description of each ITPA subtest. Each test number corresponds to those presented in Fig. 1.

Representational level

Auditory decoding (1) tests the ability to understand the spoken word. The S must answer all questions (e.g., "Do females slumber?") with a "yes," "no," or a nod.

Visual decoding (2) tests the ability to comprehend pictures and written words. The S is shown a stimulus picture which is then removed. Next, he is shown a page of four comparison pictures from which he must select the one similar to the stimulus.

Auditory-vocal association (3) tests the ability to relate spoken words in a meaningful way. The S must complete the test statement by supplying an analogous word (e.g., "Soup is hot; ice cream is ______.").

Visual-motor association (4) tests the ability to relate visual symbols in a meaningful way. The S must select from four pictures of common objects the one which goes with a given stimulus picture (e.g., "Sock goes with shoe").

Vocal encoding (5) tests the ability to express ideas in spoken words. The S is asked to describe a simple object such as a block or ball.

Motor encoding (6) tests the ability to express one's ideas in meaningful gestures. The S is shown a picture of an object (e.g., pencil sharpener) and is asked to show what is done with it.

### Automatic-sequential level

Auditory-vocal automatic (7) tests the ability to automatically use the structure of the English language. The S is asked to complete a statement such as, "Here is an apple. Here are two ______."

Auditory-vocal sequential (8) tests the ability to repeat a sequence of symbols presented auditorially. This test is similar to the standard digit repetition tests with slight modification in terms of speed of presentation, examiner's voice inflection, and sequence containing the same digit twice.

Visual-motor sequential (9) tests the ability to reproduce a sequence of visual stimuli from memory. Geometric designs and pictures are presented on chips in a certain order for five seconds, then S is required to reproduce the sequences of chips exactly.

(d) Sound Blending Test. Taken from the Monroe Diagnostic Reading Examination (1932), this test assesses auditory fusion or closure. The S is given a series of separated sounds which, if blended together will form a word (e.g., sh-oe). The S is asked to tell what word the sounds make. Monroe presents percentile norms for this test from which grade scores have been derived.

(e) Visual Automatic Test. This test was devised by Kass (1963) for the purpose of testing visual closure. The S is presented with a series of unfinished pictures and asked to guess what the completed picture will be. Each picture card adds more information until the complete outline of the picture is shown in the final (fourth) card. Kass reported a reliability coefficient of .76 using the Kuder-Richardson formula as a measure of internal consistency.

(f) Auditory Discrimination Test. This instrument, devised by Wepman (1958), was employed in this study in order to obtain a measure of auditory decoding at the non-meaningful or automatic-sequential level as the auditory decoding subtest of the ITPA measures auditory discrimination at the meaningful level. The S is presented with a series of word pairs (e.g., cad - cab) and must relate whether he hears them as the same or different words. A test-retest reliability coefficient of .91 is reported by Wepman for this test.

(g) Developmental Test of Visual Perception. This instrument was included in the psycholinguistic battery because it assesses visual decoding at the perceptual or integrational level. Each of the five subtests described below focus on relatively distinct functions of visual perception; and, when scored, raw scores are converted to equivalent age scores representing the age at which the average child achieves this score.

Frostig, Maslow, Lefever, and Whittlesey (1964) have reported split-half reliability coefficients based on their 1963 standardization employing 1459 children ranging in age from five to nine years. By subtest, the range of reliability coefficients was from .35 (CA group eight to nine on subtest IV) to .96 (for the same CA group on subtest II). The total score reliability coefficients for the entire sample on all five subtests ranged from .78 for the oldest CA group (i.e., eight to nine) to .89 for the youngest CA group (i.e., five to six).

The five Frostig subtests include:

(1) Eye-motor coordination--in which S must draw straight and curved lines between narrow boundaries;

(2) Figure-ground perception--in which S is asked to discriminate between intersecting figures;

(3) Perception of shape constancy--in which S selects squares and circles from other forms;

(4) Position in space--in which S must detect a reversed or rotated figure in sequence; and,

(5) Spatial relationships--in which the task is to copy patterns by linking dots.

All tests were administered by qualified examiners. With the exception of the Metropolitan Reading Achievement Test, which was given in groups of from three to five children, all tests were individually administered. Different examiners were employed for the posttest administration than were used for the initial test battery. Those administering the posttest battery remained naive in terms of treatment groups as well as the hypotheses generated for the investigation.

## Procedure

Following the administration of the screening battery, the test results were recorded on individual data forms provided for each S. Test data were then transcribed to profiles showing the relationship of Ss' MA, $\overline{LA}$ (as derived from the nine ITPA subtests), and the results of all diagnostic subtests.

Language ages (LA) of the ITPA were employed in lieu of standard scores which are generally used. Standard scores did not seem appropriate because they are based on a normal population and would yield inaccurate representations of performances of retarded Ss. Ordinarily, the MA or total LA is computed in order to determine expected level of performance. However, the $\overline{LA}$, as proposed by Bateman (1963, b), served as the "base line" or expected level in this study because it has been found to be independent of MA and CA and seems to better represent the over-all level of psycholinguistic functioning.

With the exception of the visual automatic test (Kass, 1963) for which only standard scores exist, scores of the remaining diagnostic tests were converted to equivalent age scores for comparison with the psycholinguistic base line on the profile forms. Although the visual automatic test was not graphically comparable to any of the subtests on the profile (i.e., in terms of age level), it was placed on all profile figures (e.g., Figs. 3 through 7) in terms of a raw score scale for the purpose of pre- and posttest comparisons as well as for ascertaining each child's score within the range for all _S_s in the sample. Application of the standard scores which accompany the visual closure test were not considered appropriate since the norms apply to a normal population only.

From the results obtained on the screening battery, two judges (a graduate student in special education with wide experience in psycholinguistic diagnosis, and the investigator) performed independent analyses of all 32 _S_s, determining deficient areas in terms of process, level, and channel and summarizing basic problems to be remediated. The analysis included attention to abilities, where possible, as well as to disabilities. The criterion for determining a disability was an age score two years below the $\overline{LA}$ obtained by _S_. A two year criterion was arbitrarily chosen and appeared to be consonant with what is considered to be a "significant discrepancy" between expected and actual performance (Bateman, 1964, a).

As previously noted, five triads were matched on the basis of similarity of weaknesses and strengths shown in their respective profiles. The _S_s in each triad were then placed into one of the three groups on the basis of random assignment.

All _S_s in the A and B treatment groups were seen individually at regular intervals for a total of 30 half-hour sessions. All tutoring occurred during school hours according to a schedule designed to fit the school's basic regimen. For each session and for each _S_ in groups A and B, lesson plans were prepared by the respective tutors. Lesson plan forms were provided by the investigator for the sake of uniformity.

An example of a lesson plan, followed by the investigator, is found in Fig. 8.

### Group A treatment

The Ss in group A were tutored by the investigator who was viewed by the school's population as a member of the professional staff.

The basic rationale underlying the psycholinguistic approach employed by the investigator rests on the assumption that some children do not develop evenly in all areas of psycholinguistic functioning. They may function above their expected level in some areas, at this level in others, and below it in still some others. Hence, the learning disabilities approach strives to eliminate these discrepancies in development and attain an even or consistent level of functioning in as many areas as possible. The elimination of such discrepancies and the approach per se are based on a philosophy of remediation (Kirk, Kass, and Bateman, 1962) which implies the implementation of the following principles in order to effectively promote the amelioration of learning disabilities. First, use the child's abilities to bring up his disabilities. Second, attempt to ameliorate the behavioral symptoms rather than the causes since the location or analysis of causative factors rarely reveals what to do in order to treat the disability. Third, recognize and teach at the appropriate level and area in terms of the child's disability area. Instruction must be modified continually to fit the child's current level of functioning in each developmental area. Finally, emphasis should be placed on ameliorating only the specific disabilities. Recognizing that the child himself has for years been depressing these disability areas and relying upon his strengths, there exists the possibility of increasing the discrepancies by remedially stressing areas other than the weakest. Specific treatment given by the investigator can be found in the case studies of group A Ss presented in Chapter IV.

Figure 8

Sample of Remedial Lesson Plan

Name A-3 Teacher Minskoff Lesson no. 4

Lesson Objective(s):

Vocal Encoding: Vocalize for (1) conversation, (2) quality of ideas, and (3) duration of time.
Motor Encoding: Pantomime actions depicted in stimulus pictures. Carry actions through to new idea(s).
Vocal and Motor Encoding: Act out a situation explaining what is being done based on stimulus question provided by tutor.

| Time | Materials | Activity |
|---|---|---|
| 10 mins. | Toy telephone.<br>Clown (electric rig with light for nose). | Conversation via "telephone" with tutor. Discussion of weather, ice, cold, and safety. A-3 required to keep talking while clown's nose is lit. |
| 10 mins. | Goldstein-Levitt pictures (series 4) | Pantomime what is seen in pictures (e.g., girl feeding doll, throwing ball). |
| 10 mins. | - | Tutor tells A-3 to act out certain situations. At the same time she must explain her actions (e.g., ironing clothes). |

Comments:

A-3 intrigued by use of clown and phone. Although one word comments most of the time, beginning to break out of this and give longer responses.

Her movements in the pantomime were unrealistic. I would show her the necessary movements to show more realistic model. Her mimicry looked believable, and she did better.

Slightly better in motor encoding on this lesson, but her vocalization for telling what she was doing was very poor.

On the whole this was a good session. A-3 enjoyed novelty, and yet not carried away by it.

### Group B treatment

The five Ss in group B were divided among three remedial specialists employed by the Edenwald School. Two of the remediators tutored one child each; the third tutored three children, all individually. Each S in group B was scheduled so as to be part of the regularly scheduled load carried by his respective staff tutor.

The three remedial specialists were very experienced in their respective areas: two had extensive backgrounds as remedial reading specialists; the third was a speech therapist who, in recent years, had become actively interested in language training and remediation. All three were receptive to the investigation, complying with the investigator's ground rules in terms of accepting his randomization, lesson plan assignments, over-all time schedule, and many other logistical items while remaining naive about the hypotheses and all other aspects of the design throughout the experiment. None of the three remediators were familiar with the ITPA, its theoretical framework, the learning disabilities approach as defined for group A, or the method of profile diagnosis as employed by the investigator. The only direction given the group B remediators was that they not deviate from their usual diagnostic or remedial procedures and that they treat each S as they would under ordinary circumstances.

The diagnoses and remediation given by the remediators are presented in the case studies in the following chapter. Presentation and examination of diagnoses were made possible by reviewing Ss' cumulative folders which contained recent diagnostic evaluations. An analysis was made of the lesson plans prepared by the remediators of the B group. With respect to the 15 Ss in the remediation aspects of the study, the total number of diagnostic reports obtainable from Ss' folders was 11 reading diagnoses and three speech evaluations. For one S no report in either diagnostic category was available. One purpose of examining diagnoses and lesson plans reported by the examining staff remediators was to ascertain whether the theoretical differences, proposed in Chapter II and described in the following section, could actually be found. A second objective was to determine, where possible, whether earlier diagnostic evaluations coincided with treatments subsequently given by them.

From the analyses of the diagnoses and lesson plans of the group B remediators, it seemed apparent that a systematic approach was not employed; rather an undifferentiated developmental program was used. This appeared true for the most part, but not always, since two of the 14 available diagnoses seemed to fit the learning disabilities approach. In addition, one of the five sets of remedial lesson plans for the B group also seemed to fit the learning disabilities approach. These two diagnoses (of separate children) and one remedial plan were given by the same remedial specialist. The inference cannot be made, however, that the learning disabilities approach was used systematically as an underlying approach to all diagnosis and remediation, since the same remedial specialist showed no consistency in other diagnoses in this respect.

## Comparison of A and B approaches

It is appropriate that an over-all view of the approach (approaches) of the B group remediators be presented here. On the basis of the investigator's examination of the diagnoses and lesson plans made by the staff remediators, the following differentiation between the B approach (i.e., the traditional) and the A approach (i.e., the learning disabilities) was made.

1. Basic viewpoint
   a. In the A approach, where emphasis is on process, there is a broad view of learning disabilities; problems in any of 17 areas are considered.
   b. A more limited view of learning disabilities prevails in the B approach; that is, attention is most frequently directed to reading achievement or articulation problems per se.

2. Diagnosis

a. In the A approach there is a theoretically based, systematic examination of learning characteristics by the use of 17 subtests to assess as many areas as possible which are related to psycholinguistic functioning with all children.

b. The B approach is characterized by a random examination of learning characteristics. Although readiness and/or reading achievement tests are used with all children, there is sporadic use of diagnostic tests with some children, with no apparent rationale for their use.

3. Concept of readiness

a. In the A approach development or maturation may be guided; that is, a philosophy of actively developing readiness by treating the disability is found.

b. The principle apparent in the traditional approach seems to be to wait for development and maturation to occur. Consequently, there is no treatment, or treatment is held in abeyance, because the child is "not ready" for learning. Upon retesting (e.g., two years later), if the child is still "not ready," treatment is still withheld.

4. Nature of remediation

a. In the learning disabilities approach the specific remediation necessarily relates to each diagnostic finding. In addition, treatment of learning disabilities found in the diagnosis implies use of abilities, and relies little on the influence of causes or global diagnostic categories.

b. In the B approach remediation may not necessarily relate to the diagnosis; for example, teaching of reading by a phonic method when no diagnosis of sound blending or other auditory skills has been made. Furthermore, influence of causes and global

> categories on remediation is often evident. For example, although a child showed a disability, remediation was either not recommended or not provided because of "neurological impairment" or "emotional disturbance."

Group C treatment

The five Ss in group C remained in their respective classes and followed the school's usual routine as though they were not included in the study.

Post-remediation testing

At the conclusion of the 30 session treatment period, the 15 Ss in the three groups were re-examined on all instruments previously administered with the exception of the Stanford-Binet Intelligence Scale. Wherever possible, a second form of a test was given (i.e., Auditory Discrimination Test and Metropolitan Reading Test). As previously noted, the posttest examiners were naive about the assumptions and design implicit in the investigation as well as the groups into which the Ss were assigned.

### Methods of Evaluation

To test each of the three sub-hypotheses of Hypothesis I, the descriptive aspect of the investigation, only the pretest scores were used. In order to determine whether the differences between obtained scores and expected levels were significant, t tests based on Edward's (1962) randomized blocks design were applied. The mean language age for all ITPA subtests was used as the expected level.

To test Hypothesis II, an analysis of variance based on the randomized blocks design (Edwards, 1962) was employed. This analysis was applied to the differences between the pre- and post-remedial scores in the disability area for each triad. In addition, the differences between the pre- and post-remediation $\overline{\text{LA}}$s were analyzed using the same randomized blocks design.

The findings relative to the remediation aspect (i.e., Hypothesis II) of the study were also examined in the form of case studies. Justification for the use of a case study approach was seen in the fact that each S posed a distinct set of problems which statistical tests alone would tend to camouflage rather than clarify. Such problems are not always amenable to traditional experimental design, and it has been demonstrated that investigation of abnormalities in a single S can lead to findings that are generalizable to other individuals (Kirk, 1966).

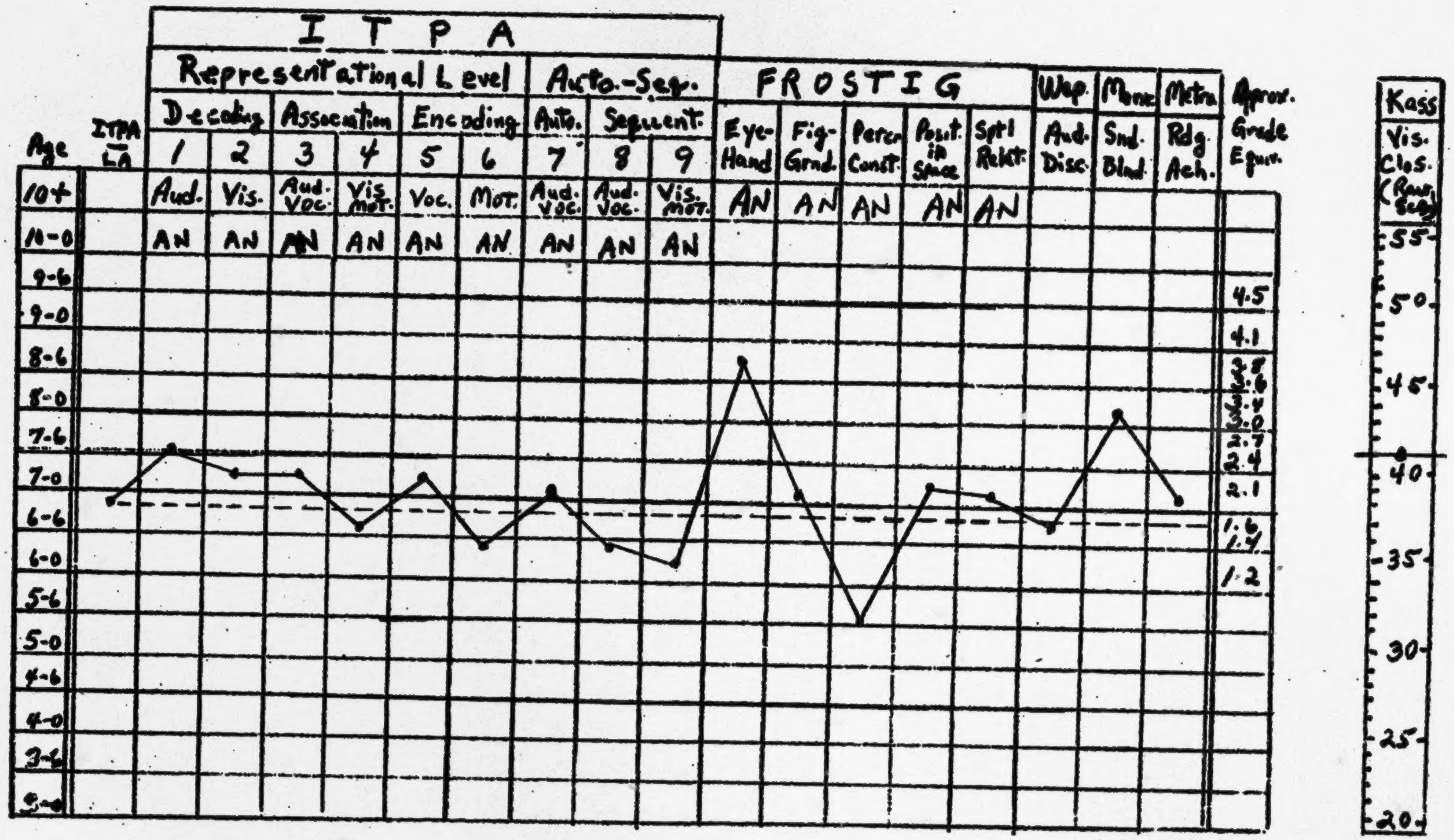
# CHAPTER IV

# RESULTS

In this chapter the results obtained are examined in two parts. The findings concerning the descriptive aspect of the investigation (i.e., Hypothesis I) are considered first; that is, the results of the statistical analysis of the total sample (N = 32) are presented. Second, the findings relative to the remedial aspect (i.e., Hypothesis II) of the study are examined in the form of case studies followed by a statistical analysis pertinent to this aspect of the study. A single summary of results follows the presentation of both statistical and case study analyses.

## Results Related to Descriptive Characteristics

The profile shown in Fig. 9 represents the mean performance of the total group on each of the diagnostic subtests of the screening battery. The dotted, horizontal line depicts the mean of the mean language ages for all 32 *S*s. Visual examination of the profile in Fig. 9 shows that only a few subtests (e.g., eye-hand coordination) deviate markedly from the grand $\overline{LA}$. Since the profile, as presented, gives no indication of significant abilities and disabilities for the group, t tests based on Edwards' (1962) randomized blocks design for two treatments were applied in order to determine if the means for each subtest differed significantly from the expected level. The results of this statistical treatment are presented in Table 8. The Visual Closure Test (Kass, 1962) has been omitted from the table because its scoring precludes the use of an age scale; hence, it was not comparable to the $\overline{LA}$s on the statistical tests applied. As noted in the previous chapter, only a raw score was used for examining scores on the Visual Closure Test.



Mean of the $\overline{LA}$ -----------

Fig. 9. Profile of $\overline{LA}$s by subtest for the total descriptive sample (N = 32).

## Table 8

## T test Values of 16 Diagnostic Subtests Compared to the Mean Language Age for the Total Sample of 32 Ss.

(Randomized Blocks Design, Edwards, 1962).

| Level | Subtest | t value |
|---|---|---|
| Representational | Auditory decoding | 3.06*** |
| | Visual decoding | 1.44 |
| | Auditory-vocal association | 2.96*** |
| | Visual-motor association | -1.38 |
| | Vocal encoding | 1.14 |
| | Motor encoding | -1.51 |
| Automatic-Sequential | Auditory-vocal automatic | 1.49 |
| | Auditory-vocal sequential | -1.72* |
| | Visual-motor sequential | -2.46** |
| | Eye hand coordination | 7.37**** |
| | Figure ground perception | .77 |
| | Perceptual-shape constancy | -4.08**** |
| | Position in space | 1.33 |
| | Spatial relationships | 1.28 |
| | Auditory discrimination | - .69 |
| | Sound blending | 3.66**** |

*Significant at .05 (one-tailed).
**Significant at .01 (one-tailed).
***Significant at .005 (one-tailed).
****Significant at .0005 (one-tailed).

As can be seen in Table 8 significant abilities of the group as a whole were found for eye hand coordination, sound blending, auditory decoding, and auditory-vocal association. Significant disabilities were found to be in perceptual-shape constancy, visual-motor sequencing, and auditory-vocal sequencing.

Because of the range of scores possible on the sound blending test, a cautious view must be taken in terms of the finding that this was one of the significant abilities for the group. The range of scores possible on the ITPA is two and one-half through nine and on the Frostig it is two through ten; however, the Sound Blending Test, the age equivalencies of which are derived from grade equivalencies, contains a lower age limit of six years or first grade. Because of this constricted lower range, _S_s could not score lower than six years. Thus, the sound blending ability found for the total group may have been due to a statistical artifact rather than any "true" sound blending ability of the _S_s.

With regard to Hypothesis I, that the children in this study will reveal similar learning characteristics to those found by Bateman and Wetherell (1965), only a partial confirmation that the mentally retarded have a deficit at the automatic-sequential level was obtained. The statistical analysis reported in Table 8 revealed that the group performed below its expected level on two of the three automatic-sequential level subtests of the ITPA (i.e., auditory-vocal sequencing and visual-motor sequencing) and at its expected level on the auditory-vocal automatic subtest, thereby supporting, in part, sub-hypothesis Ia in which it was predicted that the group would perform below its expected level on all three ITPA subtests at the automatic-sequential level. The deficit found is indicative of a short-term memory problem since the auditory-vocal and visual-motor sequencing subtests assess memory functions.

From Table 8 it can be seen that the group's performance on the remaining seven subtests, included at the automatic-sequential level, failed to uphold the prediction made in Hypothesis Ib, that is, that the group would perform significantly below its expected level on all the subtests included in the extended ITPA model at the automatic-sequential level. Only one, the perceptual-shape constancy subtest showed performance significantly below the group's expected level. In contrast, two of the subtests in the extended model (i.e., eye-hand coordination and sound blending) produced performances significantly above (.0005) the expected level for the group.

Further examination of Table 8 reveals that the group performed at or significantly above its expected level on all subtests at the representational level of the ITPA. Statistically, no confirmation was found for Hypothesis Ic in which it was predicted that this group would perform at its expected level on all representational level subtests with the exception of motor encoding, on which performance would be significantly below expectancy. Performance on two representational level subtests, auditory decoding and auditory-vocal association, was significantly above (both at .005 level) the expected level for the group, but for motor encoding, the subtest in question, adequate performance at the expected level for the group was found.

It is important to note that statistical analyses which employ only means (e.g., Fig. 9) or which compare only means (e.g., Table 8) tend to cloak important data which, unless examined in terms of variability or dispersion, would otherwise be unobserved. For example, Fig. 10 presents the ranges obtained on each subtest, thereby belying the information obtained in the preceding profile (i.e., Fig. 9) devoted only to the mean performance of the group. These ranges, which on some subtests run the entire gamut of ages on the profile, provide a more realistic picture of the spread of scores.

Table 9 presnets a direct comparison between subtests on which there were statistically significant abilities and

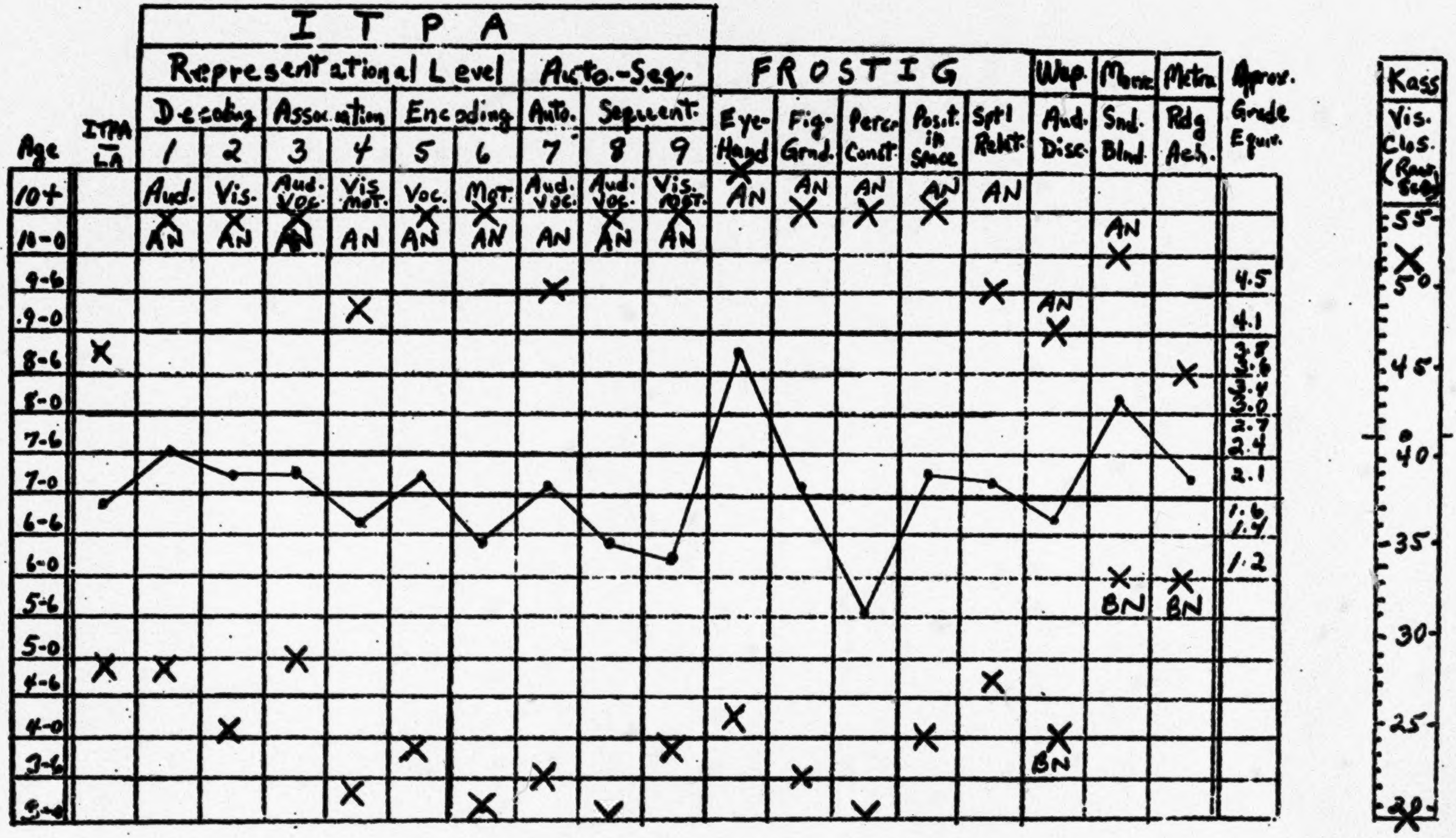


Fig. 10. Profile of descriptive sample (N = 32) showing mean strengths and weaknesses of the group as a whole and ranges of LA scores per subtest.

## Table 9

## Comparison of Statistical Results and Individual Expected Levels for Determining Abilities and Disabilities

| Subtest | Statistical Result for Total Group | Use of Individual Expected Levels | | |
|---|---|---|---|---|
| | | Disability (N) | Ability (N) | Expected Level (N) |
| Auditory Decoding | Ability*** | 0 | 11 | 21 |
| Visual Decoding | Expected | 2 | 8 | 22 |
| Auditory-vocal Association | Ability*** | 0 | 4 | 28 |
| Visual-motor Association | Expected | 5 | 0 | 27 |
| Vocal Encoding | Expected | 3 | 10 | 19 |
| Motor Encoding | Expected | 7 | 6 | 19 |
| Auditory-vocal Automatic | Expected | 2 | 0 | 30 |
| Auditory-vocal Sequential | Disability* | 6 | 5 | 21 |
| Visual-motor Sequential | Disability** | 8 | 2 | 22 |
| Eye-hand Coordination | Ability**** | 0 | 18 | 14 |
| Figure-Ground Perception | Expected | 1 | 9 | 22 |
| Perceptual Constancy | Disability**** | 16 | 1 | 15 |
| Position in Space | Expected | 2 | 10 | 20 |
| Spatial Relations | Expected | 0 | 6 | 26 |
| Auditory Discrimination | Expected | 4 | 7 | 21 |
| Sound Blending | Ability**** | 2 | 8 | 22 |

*Significant at .05
**Significant at .01
***Significant at .005
****Significant at .0005

disabilities (for the total group) and the number of Ss in the total sample who, by use of their own two year discrepancy criterion, were found to have abilities, disabilities, or performed at their expected level. Exemplified in Table 9 is the fact that statistical determination of disability or ability areas for the group as a whole has little bearing on the individual child who does not fall into the ability or disability category on a particular subtest. This inconsistency can be observed in Table 9 by noting that auditory-vocal association, for example, was a significant (.005) ability for the entire group, yet only four of the 32 Ss actually showed this to be an ability area as opposed to the remaining 28 Ss who functioned at their expected level in accordance with their own criterion of a two year discrepancy. A similar inconsistency may be observed for the auditory-vocal sequencing subtest wherein six Ss are classified as having a disability and 5 Ss have an ability; yet the statistical analysis showed this to be a significant (.05) disability area. In essence, the dispersion and heterogeneity of scores evidenced in both Fig. 10 and Table 9 give credence to the notion that the group data should not be generalized to all or even most individuals.

## Results Related to Remediation

### Case studies

The following 15 case studies are presented in the order of group treatment; that is, the five Ss in experimental treatment group A are presented first, followed by comparison treatment group B, then control group C.

Included in each case study are a description of the S's background (e.g., birth history, home environment, etc.); diagnostic data as reported by a staff remedial specialist; the investigator's diagnosis; treatment relative to the investigation; post-remediation evaluation; and a summary of the data presented.

## CASE A-1

### Background

A-1 is a girl who at pretesting was 11 years old and had been at Edenwald for 1 month. Her history revealed that she was an unwanted child, and her mother had attempted to terminate the pregnancy several times. Her delivery was reported as normal, but her development was delayed especially in language and self care.

She is the younger of two children of a middle class family. Her sibling is described as bright, dependent, and demanding. The mother is reported as dependent and immature; the father as passive and dependent upon his own parents.

After one year in kindergarten, A-1 was placed in a special class for the mentally retarded in which she remained until placed at Edenwald.

She was admitted to Edenwald because of her negative, infantile, and demanding behavior as well as for her parents' inability to cope with her.

### Diagnosis by staff remedial specialist

Upon her admission to Edenwald, A-1 was evaluated by one of the remedial reading specialists. The following test results were obtained:

| Test | Score |
|---|---|
| Gray's Oral | 0 |
| Metropolitan Readiness Test | |
| a. Reading Readiness | B or High Normal |
| b. Number Readiness | B or High Normal |
| c. Total Readiness | B or High Normal<br>at 84th percentile |
| d. Draw-A-Man Test | D or Below Average |
| Gates Primary Word Recognition | 2.0 |
| Gates Diagnostic Word Perception | No grade score |
| Gates Primary Paragraph Reading | 1.7 |

The following tests were administered but no specific scores were reported: Laterality Tests (parts of the Barger and the Harris); Roswell-Chall Word Analysis Skills; two subtests of the Gates Diagnostic Tests; the Wepman Auditory Discrimination Test; and the Roswell-Chall Auditory Blending Test.

The remedial specialist observed that A-1 should have been reading at the beginning second grade level, but was reading at the primer level; thus, she concluded that A-1 needed remedial reading. From the diagnostic test results, it was found that A-1 was adequate in visual and auditory areas. The examiner believed her reading problem was due to "maturational lag, slow development, and emotional problems." She recommended remedial reading pending the conclusion of the present study.

### Diagnosis by investigator

Psychometric. On the Stanford-Binet Intelligence Scale A-1 obtained an IQ of 61 and an MA of 6-6. She scored at the 1.7 reading grade level on the primary form of the Metropolitan Achievement Test; therefore, she was seen as not having a reading problem. This is at variance with the results obtained by the staff remediator, probably as a result of the previously obtained higher MA.

Psycholinguistic. A-1's pre-remediation profile is shown in Fig. 11. Her lowest score was in visual-motor sequential (4-4), and this was 29 months below her $\overline{LA}$ of 6-9. She was also low on the motor encoding (5-0) and auditory-vocal sequential (5-1) subtests. She could sound blend only two words; thus she showed a deficiency in this area. This finding is at variance with the remediator's finding that A-1 was adequate in auditory blending on the Roswell-Chall Test. The two major disabilities were viewed as visual-motor sequencing and sound blending, and these were the two areas attended to in remediation. Although secondary deficits were found in motor encoding and auditory-vocal sequencing, it was not possible, within the time allowed, to treat these deficiencies.

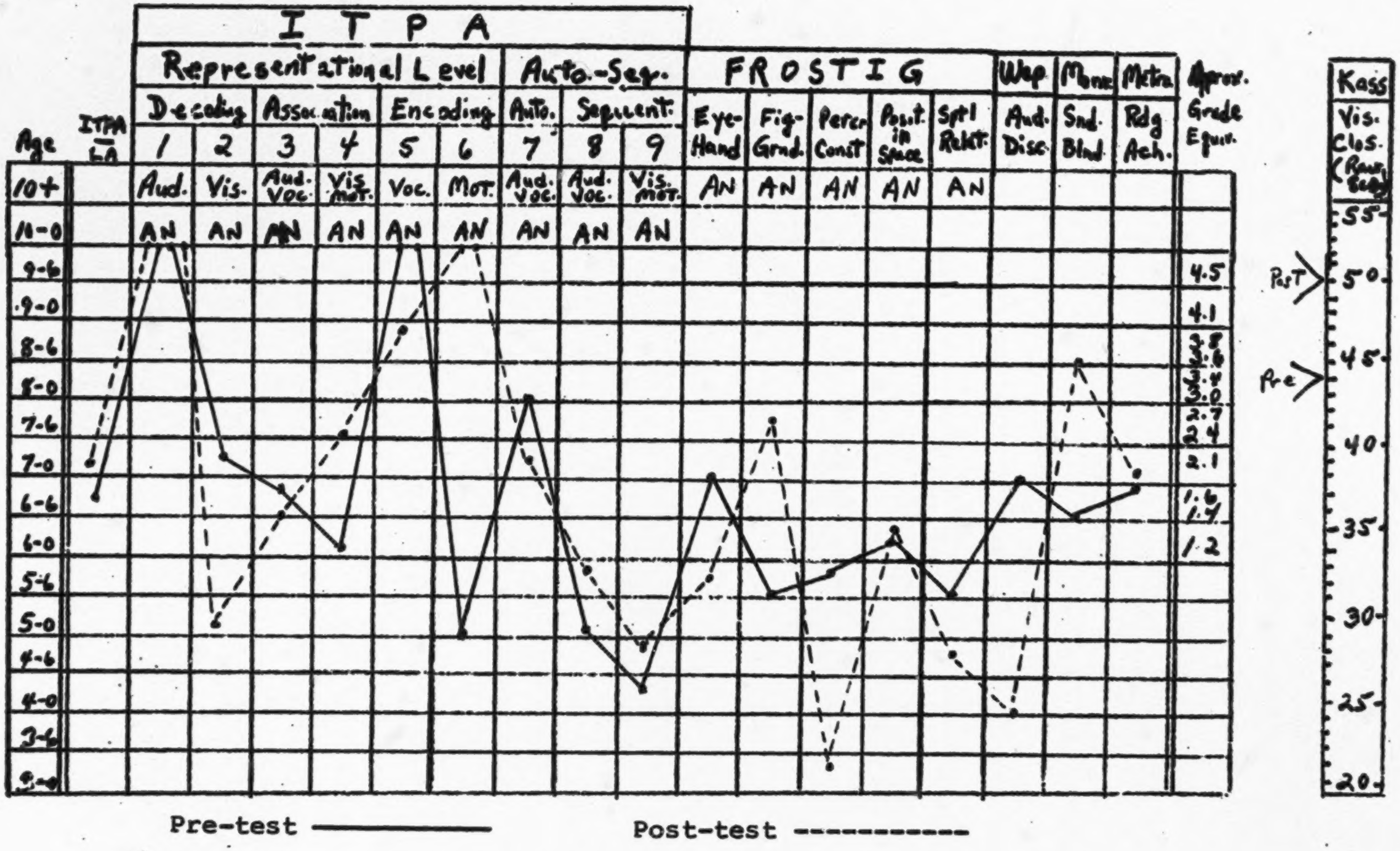


Fig. 11. Comparison of pre- and post-test results for A-1.

An asset in the auditory-vocal channel was indicated since A-1 was above her expected level in most of the tests involving this channel. This asset was most marked in auditory decoding and vocal encoding; in both she scored above norms.

Remediation by investigator

The remedial activities were directed at developing A-1's visual-motor sequencing and sound blending abilities. In treating visual-motor sequencing, the following activities were provided:

1. Visual memory for meaningful pictures presented in non-meaningful sequences.
2. Bead stringing with differing shapes. At first two shapes were used, and then three. A-1 was never able to learn to string beads with both differing shapes and colors.
3. Visual memory for symbols (e.g., +, x) with written responses.
4. Visual memory for forms with written responses.
5. Playing a toy xylophone with keys of differing colors. The investigator would play a two, three, or four note tune, then A-1 would have to play the tune by recalling the colors of the keys hit by the tutor in sequence.
6. The Fernald kinesthetic method of teaching reading was used in that A-1 would trace, say, and then write the word from memory.

Throughout these remedial activities the investigator attempted to teach A-1 to look for patterns and to label the visual stimuli in order to aid in recall of non-meaningful stimuli.

The suggestions for training sound blending in the Hegge, Kirk, and Kirk Remedial Reading Drills (1940) were used with A-1. In this respect the following activities were employed:

1. Sound blending of names of objects shown in pictures.

The visual cues were used as aids, but these were dropped early in the training.

2. Sound blending of the final word of a sentence. The context of the sentence provided a meaningful cue.
3. The tutor would sound blend isolated words, and the child would have to tell what the word was.
4. Later in the training, the child would sound blend a word and the tutor would have to tell what the word was.

Early in training there was a minimal break between the sounds of a word. As A-1 progressed, the break between the sounds was lengthened. At the beginning of training words with two sounds were used, and gradually words with three sounds were introduced.

Post-remediation test results

Fig. 11 presents A-1's post-remediation test profile. A-1's score in her deficit area of visual-motor sequencing showed a six-month increase (i.e., from a LA of 4-4 to 4-10). This does not seem to be a significant increase in terms of the size of the gain score or in comparison to her posttest $\overline{\text{LA}}$ (7-2). Thus, the remediation for this disability appears not to have been effective. This finding is supported by the investigator's observations that A-1, although not unresponsive, was often poorly motivated, and showed limited progress in the remedial activities in this area. This result may be related to Hirsch's finding (1963) that training of visual-motor sequencing disability was only effective if the remediation was like the test in terms of the nature of the stimulus and response. Only a few of the remedial activities involved stimuli and responses of the type found on the visual-motor sequencing subtest itself. Therefore, the investigator's attempts to train A-1 through visualizing all types of materials may have prevented her from developing any one area fully.

In A-1's other deficit area of sound blending, an increase of two years was found. A grade equivalent of 1.4

was obtained for the pretest and a 3.6 grade was obtained in posttesting. The remedial activities provided for this disability seem to have been successful. It is of interest that no substantial increase in reading grade was found in that she read at the 1-7 level on pretesting and the 1-9 level on posttesting. Although no direct attention to reading was given, stress on visual memory and sound blending which are correlates of reading ability was given. Conceivably, three months may have been too short a period of time for the effects of improved sound blending to have been evidenced on her reading. Furthermore, her classroom instruction in reading may have emphasized a visual approach, thus limiting her use of her improved sound blending ability.

It should be noted from Fig. 11 that there was much variability between A-1's pre- and posttest profiles. Although her pre- and posttest $\overline{\text{LA}}$s are fairly congruent (i.e., 6-9 and 7-2), she scored significantly higher on the posttest in motor encoding (a gain of 54 months in her LA) and figure-ground relationships (a gain of 33 months in her LA). Both of these high gains may have been due to the remediation given in training visual-motor sequencing. The many motor responses (e.g., writing, bead stringing) provided in these activities may have increased her ability in motor encoding. The tracing activities in visual-motor sequencing may have enhanced her figure-ground ability by focusing her attention on foreground figures. She scored significantly lower on the posttest in visual decoding, perceptual-shape constancy, and auditory discrimination. These fluctuating pre- and posttest profiles might be attributed to the fact that A-1 had been at Edenwald for only one month at the time of pretesting. Thus, she may have been in a state of transition, both physically and mentally. Although this explanation might provide insight to her improved posttest scores, it does not shed light on the poorer scores.

On the basis of observations during the 30 sessions, the investigator's impression is that A-1's deficits in visual-motor sequencing and sound blending found on pretesting were "real" even though the reliability of some of the other scores might be questioned. It is also thought that the post-test scores are "truly" representative of A-l's status in these areas after remediation (e.e., the gain in sound blending as well as the insignificant difference in visual-motor sequencing).

## Summary

In summary, A-1 is an 11 year old girl who exhibited major disabilities in visual-motor sequencing and sound blending. Remedial activities did not seem to have ameliorated the former, while they did appear beneficial in ameliorating the latter disability. The lack of significant improvement in visual-motor sequencing may be attributed to the fact that the investigator attempted to train visualizing ability with many different types of stimuli and responses. Previous research has indicated that training of visual memory is specific to the types of stimuli and responses involved. Thus, there may have been no transfer from the many different types of stimuli used in training to the stimuli on the ITPA subtest.

## CASE A-2

## Background

A-2 was ten years and four months at time of pretesting, and had been at Edenwald for three months. No information on his delivery could be obtained. It is possible that he had encephalitis at age two and one-half because his mother reported that he collapsed in the street, and then had convulsions with a temperature of 107°. His health currently is reported as good, and his EEG is normal.

He is the youngest of three children. One older sibling is in an institution for the mentally retarded. Both parents are described as seriously emotionally disturbed.

At age five he entered kindergarten, but only stayed a few days because he couldn't stand to be separated from his mother. He was placed in an institution for the emotionally disturbed, where he remained for three years, because of what was described as a destructive symbiotic relationship with his mother. Other symptoms displayed were extreme aggressive behavior toward his mother, ideational disorganization, and extreme anxiety. He was transferred to Edenwald because of improvement in his behavior (i.e., no psychotic manifestations) and the necessity of continued separation from his mother.

A-2 has had practically no formal schooling; however, it is reported that he reads at the second grade level.

### Diagnosis by staff remedial specialist

Upon his entering Edenwald a routine examination by a staff remedial specialist was administered. The following test results were obtained:

| Test | Score |
|---|---|
| Gray Oral | 3.2 |
| Gates Primary | |
| Word Reading | 2.9 |
| Paragraph Reading | 2.7 |
| Frostig Visual Perception Tests | Age Levels from 3-6 to 6-9 |
| Laterality Tests | Mixed |

No break-down of age level scores for each of the Frostig subtests was reported. The Wepman Auditory Discrimination Test and Roswell-Chall Diagnostic Test were also given, but specific results were not reported.

According to the remedial specialist's report, A-2 should have been reading at the primer level; therefore, it was concluded that he was reading about two years above his expected level. However, she reported that he was "devoid of any word attack skills."

She noted a disability in fine motor coordination and in figure-ground relationships (the only Frostig subtest score reported was for this test, and it was stated that the score was from the three and one-half to four and one-half year old level).

The remediator recommended that no remediation be given A-2.

### Diagnosis by investigator

Psychometric. On the Stanford-Binet Intelligence Scale an IQ of 58 and MA of 5-11 were obtained. He read at the 2.0 level on the primary form of the Metropolitan Achievement Test. This reading score is comparable to previous reports of his reading ability.

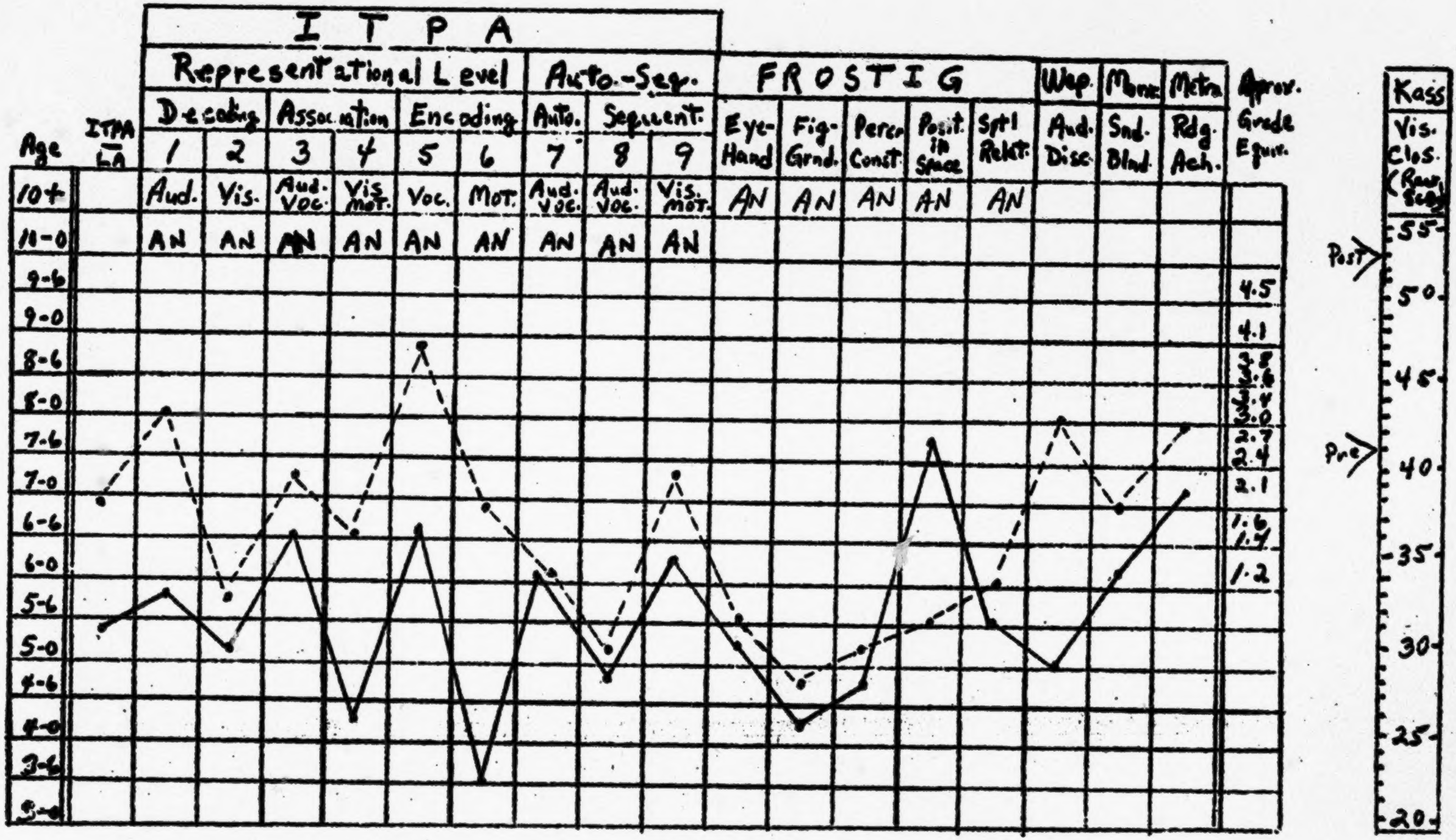
Psycholinguistic. The pretest profile is presented in Fig. 12. A disability in motor encoding was found in that it was significantly below his $\overline{LA}$ of 5-5 (his LA was 3-6 on this subtest. No sound blending skill was evidenced (i.e., he obtained a raw score of one on this subtest). Except for position in space (7-9), no other assets were noted.

Of the five Frostig subtests, A-2 obtained his lowest score (i.e., 4-3)on figure-ground perception which substantiated the staff remediator's finding for this area. However, this score was not significantly below his $\overline{LA}$ of 5-5; therefore, it was not seen as a major disability.

Remediation was directed only at A-2's motor encoding problem, and not his sound blending deficit. It was thought that in 30 sessions adequate remediation to two such severe deficit areas could not be given. His motor encoding disability seemed more marked; therefore, it was selected for remedial attention.

### Remediation by investigator

To supplement the diagnosis of a motor encoding disability, the first remedial session was devoted to further (informal) diagnostic testing. From this more specific diagnosis, it was found that A-2 had problems with body image, directionality, fine and gross motor coordination, and expressing meaningful ideas motorically.



Pre-test ———————— Post-test -------------

Fig. 12. Comparison of pre- and post-test results for A-2.

To ameliorate the body image problem, the following activities were provided:

1. Kephart activities of identifying body parts, imitation of actions, etc. (Kephart, 1960).
2. The game "Simon Says" in which A-2 had to execute the actions dictated by the tutor.
3. The game "Follow the Leader" in which the child had to execute the actions shown by the tutor.
4. Frostig's exercises for the development of body image (Frostig and Horne, 1964).

For his directionality problem the clock game recommended by Kephart (1960) was used.

To treat his fine motor coordination problem these activities were provided:

1. Bead stringing.
2. Jig-saw puzzles.
3. Connecting dots to make a picture. The object in the drawing could only be decoded if the lines were straight.

For gross motor coordination the tutor played ball with A-2 and pantomimed games (e.g., ping pong).

To train A-2 to express meaningful ideas motorically these activities were employed:

1. The game "Charades" in which the child must act out an idea and the tutor must guess what the idea is.
2. Pantomimes.
3. Acting out ideas presented in picture stimulus cards (e.g., a toothbrush would be shown and A-2 had to act out how this should be used).

At no time were items on the motor encoding subtest of the ITPA used in the training.

## Post-Remediation test results

The post-remediation profile is presented in Fig. 12. A-2 increased significantly in motor encoding as noted by the difference between his pre-remediation language age (3-6) and his post-remediation score of 6-10.

It is noteworthy that his pre- and post-remediation ITPA profiles have comparable configurations, except that his posttest profile is at a higher level. That is, except for motor encoding the relationship between the various ITPA tests remained the same but the overall level of functioning increased. Furthermore, A-2 increased considerably his $\overline{\text{LA}}$ performance (from 5-5 to 6-11) from pre- to posttest. It is possible that the training given was responsible for enhancing his total ITPA profile. For example, the increase in auditory decoding and auditory discrimination may be related to the many verbal directions given in the remedial activities. There were gains primarily in the representational level subtests because most of the training involved meaningful materials.

As expected, A-2's sound blending disability remained unchanged after remediation since no attention was given this area. The increase in his visual closure score may be attributed to the jig-saw puzzles and dot connecting activities provided in the remediation.

### Summary

A-2 was a ten year old boy who had been transferred to Edenwald from an institution for the emotionally disturbed. He exhibited a significant disability in motor encoding on pretesting. The remediation provided appeared to have been effective in ameliorating this disability area. Furthermore, his whole ITPA profile seemed to have been enhanced from the remediation as he increased in many other related areas.

## CASE A-3

### Background

A-3, a girl of 10-2 with a severe articulation problem, had been at Edenwald for 26 months when first tested for this investigation. There were contradictory reports concerning her delivery. It was reported that her mother stated the delivery was normal, while in other reports it was stated that A-3 was born by Caesarean section. Her mother had indicated that her development was normal except for her speech defect, but she could not recall the exact time for the mastery of specific developmental tasks.

A-3's mother had been in an institution for the mentally retarded, and is described as "possibly schizophrenic." Her parents were divorced, and A-3 has had no contact with her father. A-3 has two older siblings, one in an institution for the retarded, the other in a foster home.

For most of her life A-3 has lived with her maternal aunt and her grandparents. Her aunt had been in an institution for the emotionally disturbed. Her grandparents are described as emotionally disturbed as well. The grandfather, who suffers from grand mal seizures, has attempted suicide twice. It is reported that the grandmother has physically abused A-3. The grandparents outrightly reject A-3 because her father is of a different ethnic group. Her mother has expressed hatred and rejection of A-3, and has stated that she feels a "murderous rage" toward her.

A-3 had attended a public school where she repeated the first grade.

Conflicting diagnoses of A-3 are recorded. Some indicate that she is brain injured as evidenced by an abnormal EEG; others note that there is no brain injury and that her retardation is caused by genetic factors; while still others say both factors are involved. A-3 was placed at Edenwald to separate her from an "environment rife with social, emotional, and genetic chaos."

### Diagnosis by staff remedial specialist

The diagnosis made by one of the remedial specialists indicates the following test results:

| Test | Score |
|---|---|
| Gates Primary, Word Recognition | 1.6 |
| Gates Primary, Paragraph Reading | 1.8 |
| Roswell-Chall | (Unable to say individual sounds) |

| Test (continued) | Score (continued) |
|---|---|
| Frostig Test of Visual Perception | |
| Eye-Hand Coordination | 6-3 |
| Figure-Ground | 5-3 |
| Position in Space | 5-0 |
| Spatial Relations | 5-6 |
| Perceptual-Shape Constancy | (Not administered) |
| Dominance Test | (Mixed. Right Eyed and Left Handed) |

It was noted that A-3 was reading one year above her MA expectancy. However, the remedial specialist questioned the validity of the previous IQ and MA used since she had found errors in the computation of the score. A-3's scores on the four Frostig subtests administered were viewed as adequate. Some directional confusion was noted.

It was recommended that A-3 should receive speech therapy for her articulation problem and that she should be given another individual intelligence test. No remediation was suggested at that time.

In a psychological report made upon her admission, it was stated that A-3 had mirror writing.

Since her admittance to Edenwald, A-3 had been seen four times weekly for the remediation of her defective articulation. In a report by the speech therapist made one year prior to this investigation, it was noted that A-3 had a problem with building up enough oral breath pressure for the plosive sounds. No problem with understanding language was found. A-3 was described as being frustrated by her inability to say what she wanted to say.

Because her progress during the first year in speech therapy had been slow and because of the possibility of palatal dysfunction, the speech therapist referred her to a cleft palate rehabilitation center where the dysfunction was not verified.

## Diagnosis by investigator

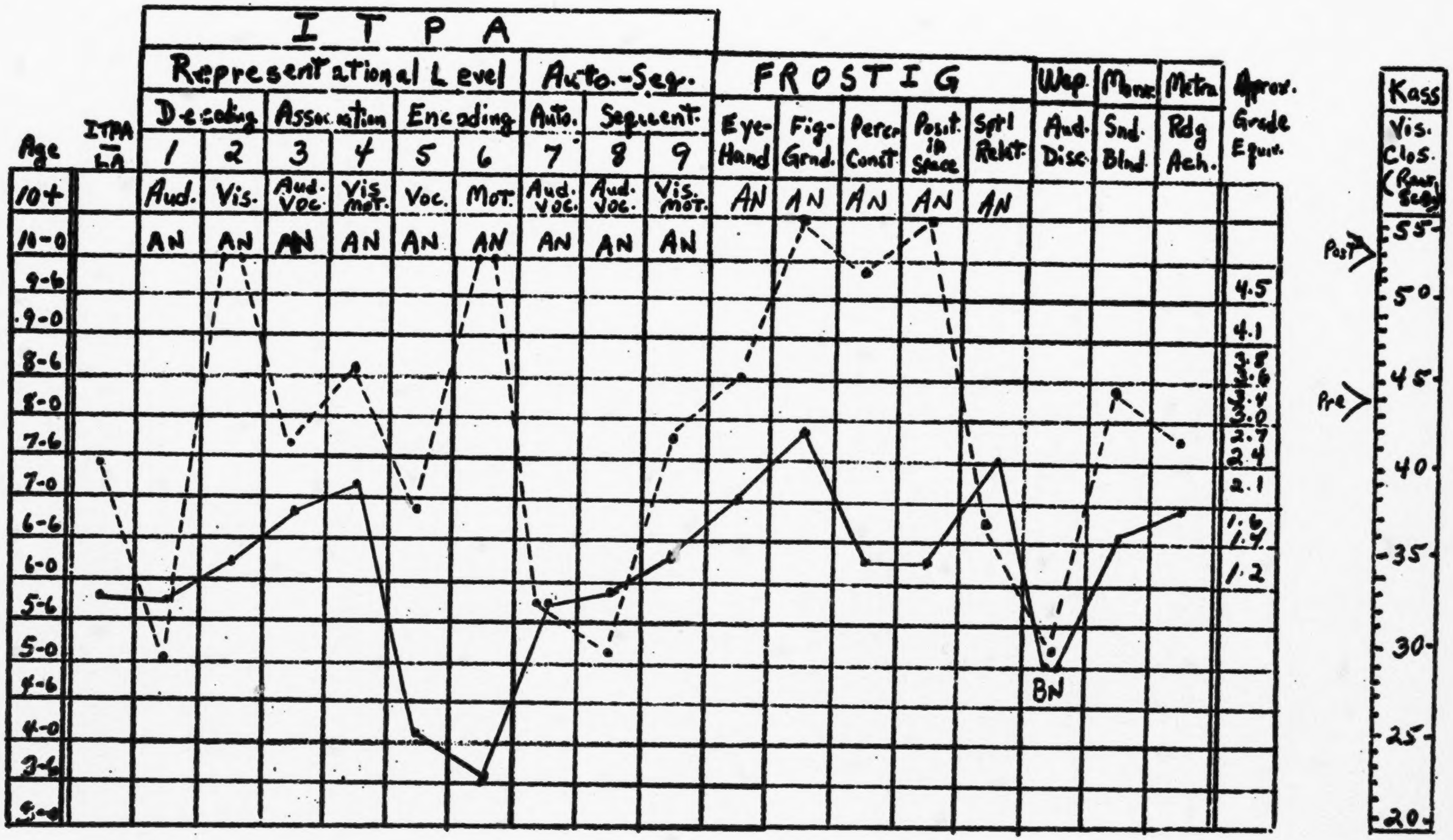
Psychometric. On the Stanford-Binet Intelligence Scale A-3 obtained an IQ of 54 and an MA of 5-6. On the primary battery of the Metropolitan Achievement Test she received a reading grade of 1.9; thus, no reading problem seemed to be indicated in view of her MA.

Psycholinguistic. The pretest profile is shown in Fig. 13. A-3 was significantly below her $\overline{\text{LA}}$ of 5-9 on the vocal encoding (4-1) and the motor encoding (3-6) subtests. Her low vocal encoding score did not appear to be directly caused by her severe articulation problem since the examiner was able to understand what she said. She either gave one-word responses or no verbal responses at all. She rarely talked in sentences, and when she did they were unconnected, incomplete, and meaningless. From these subtest scores, it was concluded that A-3 had a basic deficit in the encoding process. She was also low on sound blending and in auditory discrimination she fell below the norms for the test (with a raw error score of 19 out of 40). A-3 exhibited no particular assets.

### Remediation by investigator

The initial remedial session was devoted to a supplementary diagnostic evaluation of A-3's encoding disability which was the area selected for remediation. Her motor encoding problem was further evaluated with some Kephart tests (1960). No problems were found in body image, laterality, directionality, gross, and fine movements. Her motor encoding problem seemed to be limited to the expression of meaningful ideas. Her vocal encoding problem seemed to involve two basic components: the inability to express ideas in meaningful sentences on any level above one word responses, and secondly, the unwillingness to express ideas because of her articulation problem which was associated with frustration and failure. Her articulatory defect may have resulted in a constriction of expression both vocally and motorically.

Remedial activities were directed at the vocal, the motor, and the vocal and motor encoding problems combined. Underlying all remedial activities was the emphasis on having A-3 express her ideas freely without fear of failure and negative reinforcement. No attempt was made by the



Pre-test ———————— Post-test ------------

Fig. 13. Comparison of pre- and post-test results for A-3.

investigator to treat the articulation defect, rather, there was an attempt to have A-3 express herself freely in spite of it.

The remedial activities for vocal encoding consisted of:

1. Describing specific objects in the room or outdoors.
2. Describing pictures of objects and events.
3. Discussing familiar topics such as weather, classroom happenings, etc.
4. Discussing events and stories with special reference to cause and effect relationships as reflected in language (e.g., the use of the word because) and the use of nouns and verbs in all sentences.
5. Telephone conversations with a toy telephone (e.g., to mother, to a friend, to the investigator, etc.).
6. Game with a clown with a light bulb for a nose in which A-3 had to talk as long as the clown's nose remained lit. This game was also played so that the clown was the "tutor," and there would be no fear, on A-3's part, or negative reinforcement from the tutor.
7. Game in which A-3 played teacher and had to give "assignments" to the investigator.
8. Sharing of experiences with the investigator (e.g., walks) in which A-3 had to describe all that she saw.
9. Game in which the tutor would start a story and A-3 would have to finish it. The game was later reversed, and A-3 made up the beginnings and the investigator had to supply the endings.
10. Telling of the story by the tutor and A-3 would have to answer comprehension questions in detail and in sentences.
11. Game in which A-3 was confronted with a problem and she had to tell how she would solve it (e.g., "What would you do if you lost your purse?").
12. Game in which A-3 had to tell a story about a topic provided by the tutor (e.g., "The Magic Wand").

Most of the motor encoding activities were combined with those for vocal encoding; however, some activities exclusively for motor encoding were also provided: charades, follow the leader, acting out the use of objects in pictures, and the like.

Some of the activities provided for both vocal and motor encoding combined were as follows:

1. Drawing a picture and then describing it in sentences.
2. Pantomiming a picture and then describing it in sentences.
3. The tutor would tell a story. A-3 would act it out, then re-tell it.
4. A-3 would tell a story and act it out simultaneously.

In all remedial activities A-3 was encouraged to speak spontaneously. In addition, all activities were arranged so that A-3 would achieve success and would not be "afraid" to express herself.

### Post-remediation test results

From the posttest profile presented in Fig. 13, it can be observed that A-3 made significant gains in the two encoding subtests. She gained five years in motor encoding and almost three years in vocal encoding. This increase was attributed to the elimination of A-3's unwillingness to express herself as well as to the development of the ability to express ideas motorically and in sentences. On the vocal encoding posttest A-3 responded in sentences while she did not do so on the pretest. Her improvement in vocal encoding was subsequently noted by her classroom teacher who reported that A-3 had dramatically increased in her amount of vocalization and spontaneous speech. The teacher stated that now she couldn't keep A-3 quiet. Thus, the remediation provided seems to have successfully ameliorated A-3's encoding problem.

A substantial increase (i.e., three years) in visual decoding was found while smaller, yet still sizeable gains, were found in visual-motor association, visual-motor sequencing, and four of the five Frostig subtests. These increases are attributed to the stress on pictures and objects used in the training, and on A-3's improved ability to learn from visual stimuli so that she could encode from them. Thus, in these visual areas which were stressed incidentally in remediation, substantial improvement was found. A-3 also improved in sound blending which may be attributed to her willingness to express herself more freely. Her auditory discrimination score improved as shown by the decrease from a raw error score of 19 on pretest to 7 on posttest. It can be concluded that A-3's total profile was enhanced incidentally by remediation. Her total level of psycholinguistic functioning (i.e., $\overline{\text{LA}}$) went from 5-9 to 7-5.

### Summary

A-3, a ten year old girl with a severe articulation problem, evidenced disabilities in the encoding process. Remedial activities were directed toward the amelioration of her vocal and motor encoding deficits. A-3 showed significant gains in these two areas and her total profile as well.

## CASE A-4

### Background

A-4 was 13 years and 5 months at the time of pretesting and had been at Edenwald for 64 months.

Her delivery and development are described as normal. There is apparently a physical maturational retardation since her bone age (as shown in X-rays) is three years retarded.

She is the second oldest of four children. The oldest child was given up for adoption at birth. Her two younger siblings are in foster homes.

Her mother, who suffers from uncontrollable grand mal seizures, was in a state hospital for epileptics as a child. In addition, she is mentally retarded. Her father has served two prison sentences amounting to a total of 13 years. Both parents had severely beaten A-4 who appeared to be the least favored child. At age seven A-4 was placed in a foster home because her mother was hospitalized for severe seizures. Her father has died since A-4's placement at Edenwald.

A-4 attended kindergarten and first grade in a public school where her behavior was described as uncontrollable.

She was placed at Edenwald because of her inability to get along in both her foster home and in school, as well as her parents' inability to take care of her.

### Diagnosis by staff remedial specialist

The staff speech therapist found few articulatory problems, and thus did not recommend A-4 for speech correction. Other than this, no diagnosis by the staff remedial specialists was available.

### Diagnosis by investigator

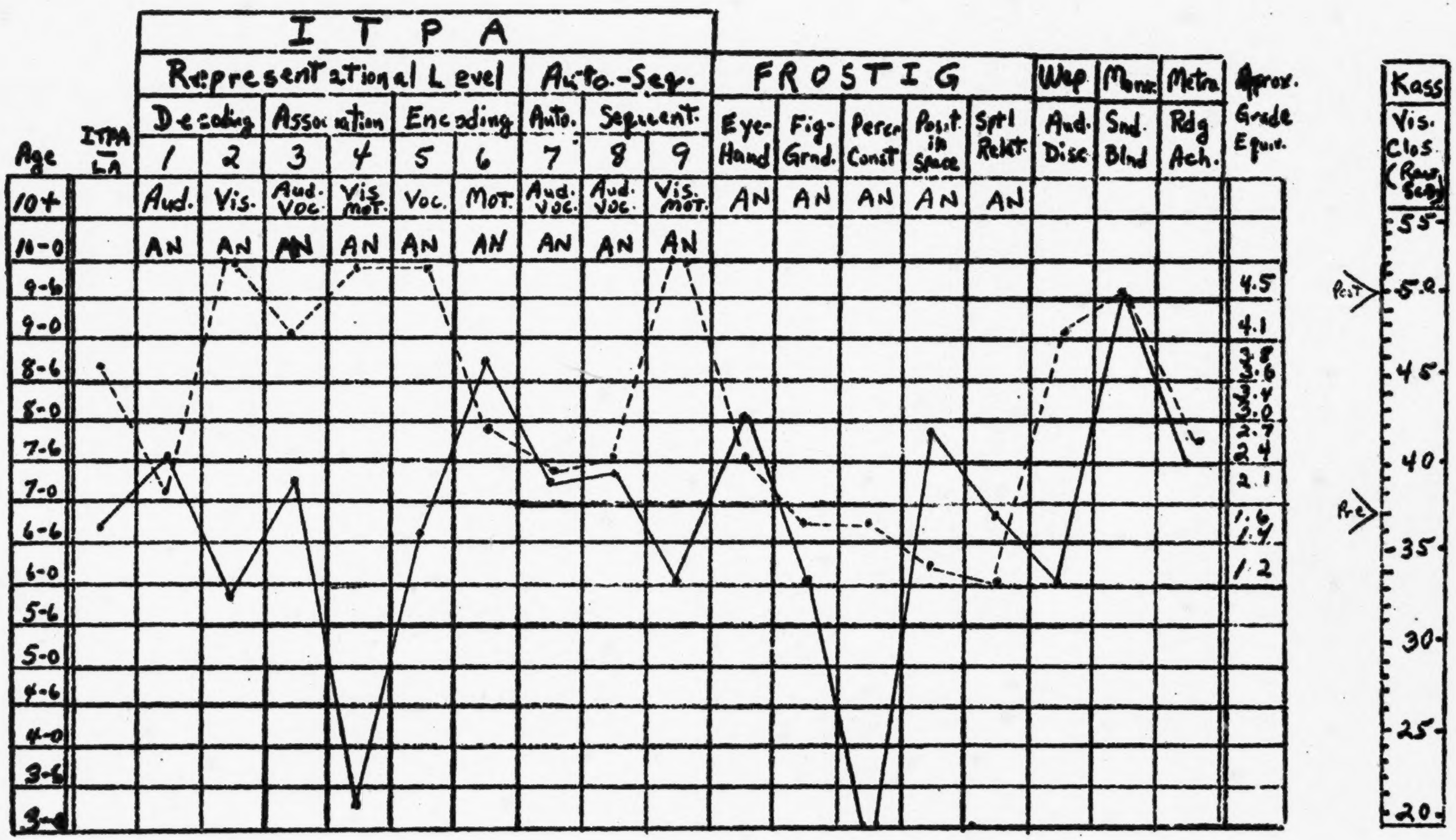
Psychometric. A-4 obtained an IQ of 62 and an MA of 7-9 on the Stanford-Binet Intelligence Scale. On the primary form of the Metropolitan Achievement Test she obtained a reading grade of 2.2. Thus, she did not seem to have a reading disability in view of her MA expectancy.

Psycholinguistic. In Fig. 14 A-4's pre-remediation profile is shown. Two major deficits were identified, one in visual-motor association and the other in perceptual-shape constancy. A-4 functioned more than three years below her $\overline{\text{LA}}$ (6-8) on the visual-motor association subtest (3-4). She obtained a zero raw score on the perceptual-shape constancy subtest. Assets in sound blending and motor encoding were obtained.

### Remediation by investigator

The goal of remediation with A-4 was to ameliorate both the visual-motor association and perceptual-shape constancy deficits. Seventy-five Frostig exercises for the development of perceptual-shape constancy were employed (Frostig and Horne, 1964). For the development of visual-motor association the following activities were used:

1. Classification of pictures of objects (e.g., pictures of furniture, pictures of clothing). As



Pre-test ——————— Post-test -----------

Fig. 14. Comparison of pre- and post-test results for A-4.

A-4 progressed, the abstractions involved in the classifications became more numerous.

2. Associations of pictures or relating which picture "went with" other pictures.
3. Pairing pictures of opposites.
4. Finding the missing parts of incomplete pictures.
5. Finding absurdities in pictures. Verbal responses were necessary in this activity.
6. Drawing inferences from pictures. Both verbal and motor responses were used (e.g., a picture of a man entering a barber shop would be shown, and A-4 would pantomime cutting hair).
7. Jig-saw puzzles of meaningful pictures. All pieces were of the same sizes and shapes so only meaningful cues could be used.
8. Arranging pictures in meaningful sequences. This task was analagous to the WISC picture arrangement subtest.

### Post-remediation test results

From the posttest profile presented in Fig. 14, it should be noted that A-4 increased six years in visual-motor association score and four years in her perceptual-shape constancy score. Thus, the remediation appears to have been effective in ameliorating these disabilities.

In addition, A-4 improved four years in visual decoding, and three years in visual-motor sequencing. There was a 13 point increase in her raw score in visual closure. It is possible that these gains may have been due to the stress on visual stimuli in the remediation (practically all remedial activities involved pictures). Furthermore, the improvement in A-4's perceptual-shape constancy ability may have aided in her recall of figures on the visual-motor sequencing subtest. The two year increase in auditory-vocal association may be attributed to the fact that some of the activities for visual-motor association involved vocal responses. A-4's $\overline{\text{LA}}$

showed a gain of two years; therefore, there was a substantial increase in her over-all level of psycholinguistic functioning.

Summary

A-4 was a 13 year old girl who had significant disabilities in visual-motor association and perceptual-shape constancy. Remedial activities were devoted to the amelioration of both problems. The increases in these two areas seem to demonstrate that the remediation was effective. Gains in areas related to the remediation (i.e., the visual areas and auditory-vocal association were also found, as well as a sizable gain in $\overline{\text{LA}}$. Thus, the remediation seems to have ameliorated her disabilities and enhanced her total psycholinguistic profile.

## CASE A-5

Background

A-5 is a girl who, at pretesting, was 14 years 1 month old and had been at Edenwald for 44 months. Her delivery was normal. Her development was somewhat delayed, especially in toilet training since it is reported that she was not trained until age 4. However, this training has not been complete since she still soils her clothes occasionally. Although she is in apparent good health at present, she has a history of a systolic heart murmur and was hospitalized at age 3 for malnutrition.

A-5 is one of five children, the fathers of whom are not known. One sibling is in a special class for the mentally retarded. Two others are in institutions for the mentally retarded; and still another is in a foster home. A-5's father deserted the family when she was two and his whereabouts since then have been unknown. Her mother, as a child, was in a special class for the mentally retarded and has been on and off public assistance.

At age six, A-5 was placed in a foster home because of physical and emotional neglect. Because of her poor adjustment in the foster home, she was placed at Edenwald.

### Diagnosis by staff remedial specialist

Upon entering Edenwald A-5 was evaluated by both the speech therapist and a remedial reading specialist. The speech therapist reported a slight lisp which might have been related to a dental structural problem. No recommendation for speech therapy was made.

The following test results were reported by the remedial reading specialist:

| Test | Score |
|---|---|
| Metropolitan Readiness Test | |
| Reading Readiness | C or Average |
| Number Readiness | C or Average |
| Total Readiness | C or Average (63rd percentile) |
| Gray Oral | No score |
| Gates Primary, Word Recognition | 1.7 |
| Gates Primary, Paragraph Reading | 2.1 |
| Roswell-Chall Diagnostic | Possesses no knowledge of sounds. Knows most, but not all letter names. Not really sure of alphabet. |
| Tests for Lateral Dominance | Left-handed and left-eyed, but other signs of mixed dominance. |
| Sample lessons to determine how child can learn | No auditory discrimination. Visual learning only fair. |

The remedial specialist believed that A-5's relatively high scores on the word recognition and paragraph reading tests were due to chance. She believed that A-5 was only at the beginning first grade level in reading, and concluded that A-5 had a reading problem because she should have been reading at grade three on the basis of her MA. The remedial specialist concluded that this reading problem was related to her lack of auditory discrimination. No remedial reading was recommended because it was thought that A-5 was not ready.

Two years after the above diagnosis, another evaluation was made by the same remedial reading specialist. The following test results were found:

| Test | Score |
|---|---|
| Gray Oral | 0 |
| Gates Primary Word Recognition | 2.0 |
| Gates Primary Paragraph Reading | 2.4 |
| Roswell-Chall | Knows only letter names; possesses no sounds. |
| Frostig Developmental Test of Visual Perception | |
| Eye-motor coordination | 10+ |
| Figure-ground relations | 6-9 |
| Position in space | 7-9 |
| Spatial relations | 7-6 |
| Perceptual-shape constancy | Not administered. |

The following tests were also reported as having been administered, but no specific scores were reported for them: the Phrase Perception, Word Perception, Spelling, Auditory Discrimination and Blending subtests of the Gates Diagnostic.

The remedial specialist reported that the discrepancy between A-5's expected reading level on the basis of her MA (i.e., grade four) and her obtained primer level was three years. She noted that A-5 was unable to read orally, lacked word analysis skills, and a basic sight vocabulary.

The specialist made this assessment to determine whether any readiness had developed in the two years since the earlier evaluation. She reported that there was no readiness for auditory discrimination, and that A-5 was two to three years below her MA on three of the Frostig tests.

It was further stated that "there is no question in my mind that she (i.e., A-5) is a so-called 'true' retardate." The remedial specialist did not believe A-5 was a good candidate for remedial help because an intensive five day a week program could not be provided. In addition, the remedial specialist stated that her remedial time should be devoted to a child who has some possibility to learn, thus implying that training would probably not help A-5 to learn. It would seem that such pessimism is related to the remedial specialist's belief thatA-5 is a "true retardate," and thus cannot be helped.

### Diagnosis by investigator

Psychometric. A-5 obtained an MA of 6-6 and an IQ of 51 on the Stanford-Binet. She obtained a reading grade of 1.8 on the primary form of the Metropolitan Achievement Test.

Psycholinguistic. A-5's pre-remediation profile is shown in Fig. 15. A significant deficit in auditory-vocal sequencing was found as shown by a 5-4 language age on this subtest which is almost three years below her $\overline{LA}$ of 8-2. A disability was also found in perceptual-shape constancy, a test not given in the Frostig battery administered by the staff remedial specialist. The scores obtained on the remaining Frostig subtests were, however, very similar to those obtained by the remedial specialist. A-5 was one and one half years below her $\overline{LA}$ on visual-motor sequencing. However, this area was not seen as a major deficit as was auditory-vocal sequencing; thus, this was not given remedial attention.

A-5 had an asset in decoding, vocal encoding, visual closure, sound blending, and auditory discrimination. These results are in conflict with the remedial specialist's findings that A-5 had a disability in the auditory channel (i.e., auditory discrimination). A-5 obtained a raw error score of only one on the Wepman Auditory Discrimination Test; therefore, this can be deemed an ability area for her.

### Remediation by investigator

The two deficit areas of auditory-vocal sequencing and perceptual-shape constancy were the foci of the remediation.

For the perceptual-shape constancy disability exercises eight through seventy of the Frostig program (Frostig and Horne, 1964) were used. During this remediation the investigator found that A-5's basic deficit was in size discrimination; thus, the Frostig lessons in this area were supplemented and expanded.

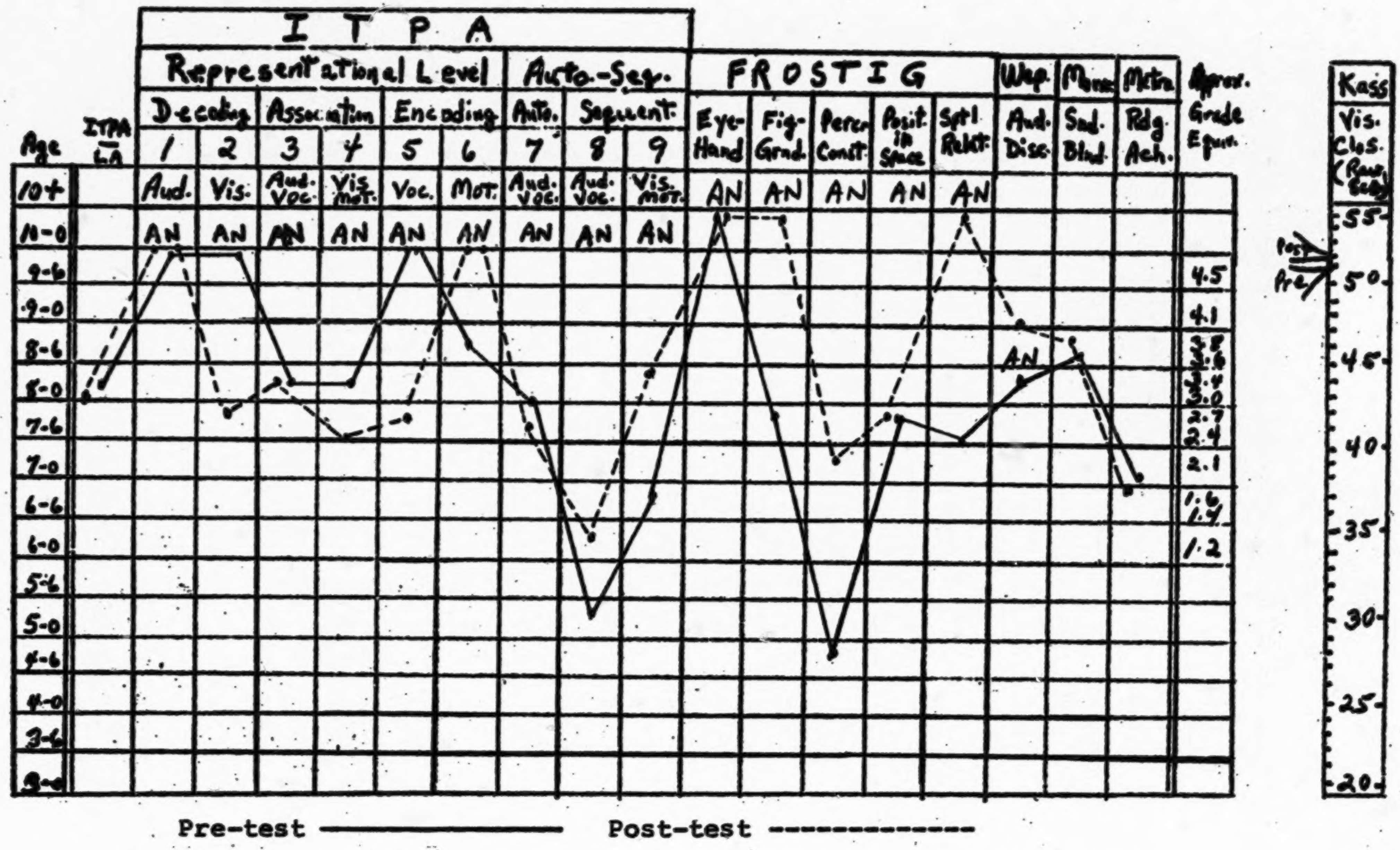


Fig. 15. Comparison of pre- and post-test results for A-5.

From supplemental diagnosis, it was ascertained that A-5's auditory-vocal sequencing problem was with non-meaningful material, and not with meaningful material.

The following activities were used to ameliorate A-5's auditory-vocal sequencing deficit:

1. Tapping or clapping a rhythmic sequence. At first, A-5 was allowed to watch the tutor tap or clap the pattern; gradually, however, the visual cues were eliminated. The sequence was increased from two to five.
2. Reproducing a series of unrelated words said by the tutor.
3. Repetition of letters spoken by the tutor.
4. Repetition of sentences spoken by the tutor. At first, the sentences were meaningful to A-5, but gradually they were made non-meaningful in terms of A-5's frame of reference (e.g., "Who knows for whom the bell tolls").
5. Auditory sequencing through playing the xylophone. Letters were imprinted on each note. The letters would be called off by the tutor and the child would have to recall them by hitting them. This activity was altered; A-5 would play a tune and then the tutor would repeat it, and she would have to determine whether the tunes played were the same or different. Visual cues were gradually eliminated.

In many of the above activities the tutor endeavored to train A-5 to recognize patterns and to group the components of the sequence since she would attend to each part and not the whole. Also, A-5 was encouraged to close her eyes since it was noted that she performed better in this manner, probably because of the elimination of distracting visual stimuli.

Post-remediation test results

As shown in Fig. 15, A-5 increased one year in her deficit area of auditory-vocal sequencing. Her post-remediation raw score was only three points higher than her pre-remediation raw score on this subtest. Since A-5's $\overline{LA}$ on the pretest was 8-2 and her posttest $\overline{LA}$ was 8-0, she continued to function at the same over-all psycholinguistic level after remediation. On pretesting her auditory-vocal sequencing score was 34 months below her $\overline{LA}$, and on posttesting it was 22 months below her $\overline{LA}$. Thus, her auditory-vocal sequencing disability, albeit not as severe as when she was first tested, was found to exist after remediation.

Several interpretations of this finding seem possible.

1. The one year increase in her auditory-vocal sequencing score was due to chance, and there was no progress in this area. This might be due to inappropriateness of the remedial activities.

2. The one year increase was the beginning of a significant increase, but the three months of remediation were insufficient time to effect a significant change.

3. The one year increase was the beginning of a significant increase, but auditory-vocal sequencing is one of the most difficult disabilities to train. This is due to the fact that no "crutches" can be readily provided as with visual materials (e.g., tracing with visual-motor sequencing problems). Crutches such as auditory grouping seem to be difficult for children to use without prompting since there is little that the child can grasp as tangible. Although the remedial activities seemed to fit the disability, they were not "good" enough because they failed to train A-5 to spontaneously use an approach to auditory-vocal sequencing. In addition, training with many different types of materials (e.g., letters, sentences, numbers, etc.) did not seem to lead to adequate performance with any one type of material.

In view of the materials employed and the successes noted elsewhere in training psycholinguistic deficits, the investigator tends to favor the last interpretation.

A-5 showed an increase of two and one-half years in her deficit area of perceptual-shape constancy. Thus, the remediation given for this disability appears to have been effective. Furthermore, this increased ability seems to have influenced increases in other areas. For example, A-5 increased one and one-half years in visual-motor sequencing. She was 17 months below her $\overline{LA}$ on pretesting and rose to 5 months above her $\overline{LA}$ on posttesting. The investigator attributed this gain to her developed perceptual-shape constancy ability; that is, her improved ability to perceive forms helped her on the visual-motor sequencing subtest which involves forms.

### Summary

A-5, a 14 year old girl who had been at Edenwald for almost four years, was found to have major deficits in auditory-vocal sequencing and perceptual-shape constancy. The remediation for the latter seemed to have ameliorated the disability; however, the remediation for the former area was not as effective as it might have been.

## CASE B-1

### Background

B-1 had been at Edenwald for nine months and was 15 years 9 months of age when pretested. His delivery was reported as full-term and normal. Developmentally, however, he had a convulsion at the age of 15 months. These convulsions continued periodically until he was eight years old.

He is one of three siblings in a financially and emotionally deprived family. His mother, as a child, had been in a special class for the mentally retarded. The home was characterized by tension and arguments.

B-1 was a severe behavior problem in school, and was placed in a special class while in the third grade. At the age of 15 he was placed at Edenwald because his family was unable to cope with his emotional outbursts, nor could they accept his retardation.

Diagnosis by staff remedial specialist

The staff remedial specialist who eventually tutored B-1 for this investigation also made a routine diagnosis several months before the investigator's diagnosis was made.

The following results were obtained from her diagnosis:

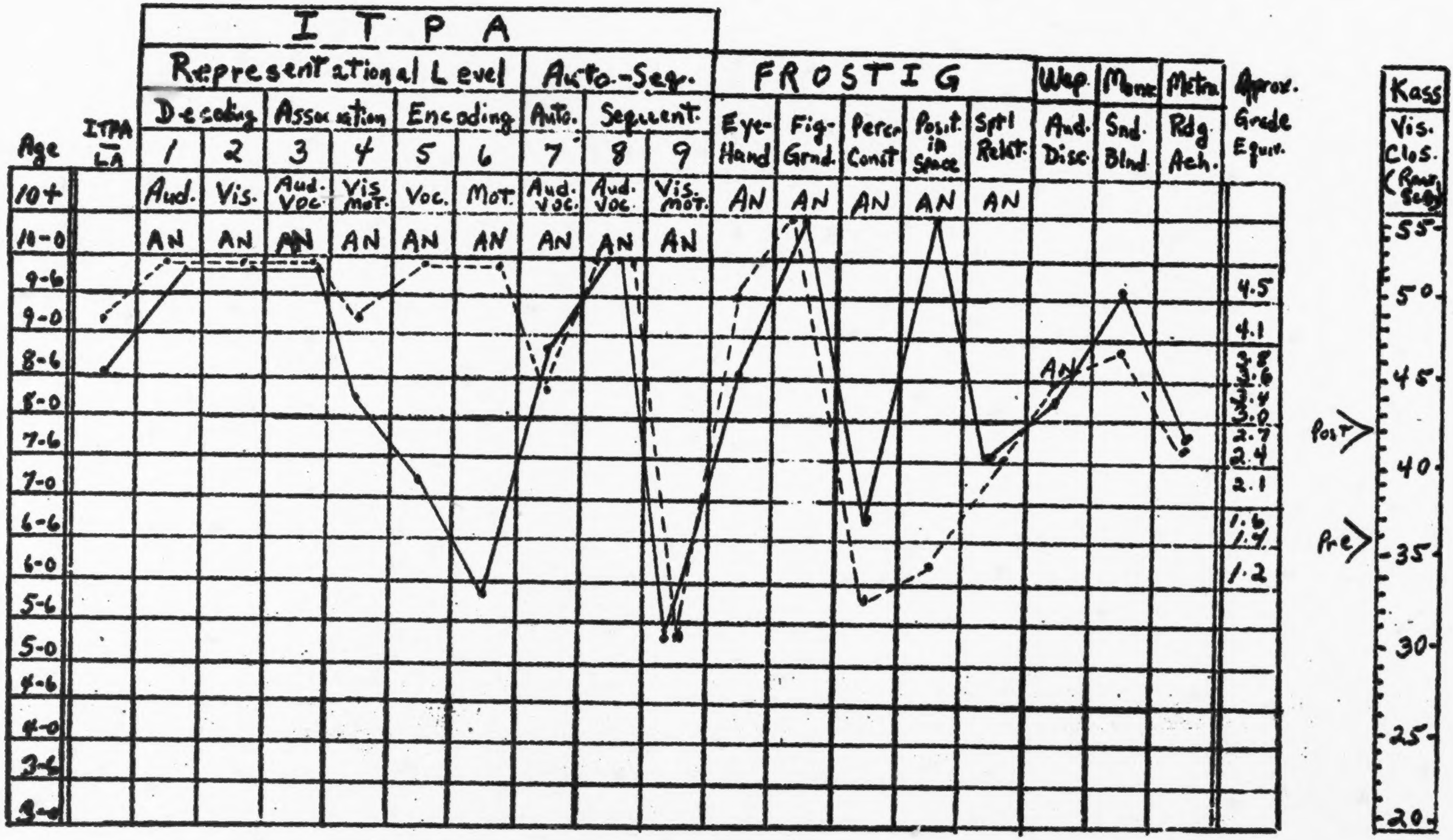
| Test | Score |
|---|---|
| Gray Oral | 4.2 |
| Gates Advanced Primary | |
| Word Recognition | 4.6 |
| Paragraph Reading | 3.6 |
| Gates Reading Survey | |
| Speech and Accuracy | 3.0 (timed) |
| Vocabulary | 5.2 |
| Comprehension | 4.2 |
| Gates Basic Reading Test | |
| Reading to Understand detail | 3.4 (timed) |
| Laterality | Mixed |

The staff remediator noted that B-1 should be reading at the fifth grade level according to his MA. Because he scored slightly below the fifth grade level on most of the tests, she concluded that B-1 had a reading problem. Thus, she recommended remedial reading with emphasis on the development of word analysis skills via a phonics approach.

Diagnosis by investigator

Psychometric. On the Stanford-Binet Intelligence Scale B-1 obtained an IQ of 70 and an MA of 10-6. On the elementary form of the Metropolitan Achievement Reading Test he obtained a grade equivalency of 2.6. This result is slightly below the reading levels obtained by the staff remediator. Although B-1 was not reading at his MA level, he was not deemed as having a reading disability since he was able to read at the fourth grade level with comprehension on the tests given by the staff remediator.

Psycholinguistic. The pretest profile for B-1 is presented in Fig. 16. On the ITPA he obtained scores more than two years below his $\overline{\text{LA}}$ (8-6) on the motor encoding (5-10) and visual-motor sequencing (5-4) subtests. This visual-motor



Pre-test ———————— Post-test ------------

Fig. 16. Comparison of pre- and post-test results for B-1.

sequencing disability was not attributed necessarily to a motor encoding problem because no other tests involving motor responses were as severely affected. It was concluded, therefore, that B-1 had two basic deficits.

Assets in the decoding process and in the auditory-vocal channel were determined. On the Frostig battery B-1 also exhibited abilities on the figure-ground perception and position in space subtests.

### Remediation by staff remedial specialist

The major goals for practically all 30 sessions were listed by the remedial specialist as teaching B-1 to read independently and with comprehension. Most of the remedial sessions were concerned with silent reading followed by comprehension questions. In addition, oral reading, vocabulary development, and syllabification were stressed. Phonics instruction which was strongly recommended in the remediator's diagnosis was given in only 4 of the 30 sessions. Most of the time a basal reader was used while such materials as Weekly Readers, a phonics book, Reader's Digest, etc. were added for variety.

It appears that a developmental reading program was provided.

### Post-remediation test results

In Fig. 16 the posttest results are contrasted with the pretest results. It can be observed that B-1 increased four years in motor encoding and two years in vocal encoding while no other major gains were noted. These increases cannot be attributed to the remediation given by the staff remediator since, as described above, no stress was placed on these two areas. However, shortly after remediation commenced, B-1 was selected as the lead actor in the school's annual musical-comedy production. Concurrent with the last few weeks that remediation was given, B-1 was involved in extensive rehearsals for his role. Therefore, it is quite possible that through these rehearsals, he was developing his encoding ability.

On all other subtests B-1 performed at about the same level as on the pretest. It is noteworthy that on the visual-motor sequencing subtest B-1 obtained the same score as on the pretest; no improvement in this basic disability was found. This finding was to be expected since no emphasis was given to this problem by the staff remediator. In addition, no improvement in reading was found even though 30 sessions of developmental reading were provided. It is possible that, had B-1's visual memory disability been ameliorated, his reading level would have increased.

### Summary

Two basic disabilities were exhibited by B-1: one in motor encoding and the other in visual-motor sequencing. The motor encoding disability was apparently ameliorated by constant rehearsals for a school play. No gains were observed in the visual-motor sequencing disability, probably as a result of no stress being given to this in the remediation provided.

## CASE B-2

### Background

B-2, a withdrawn, uncommunicative boy of 14 years 5 months at pretesting, had been at Edenwald for 32 months. He is the older of two children of middle class parents. No abnormalities in his delivery or early development were noted. Although he has had no seizures, B-2 is reported to have had abnormal EEG tracings. It was recorded that he is brain injured and medications were prescribed.

After three years in the public schools (two of which were spent in the first grade), B-2 attended a private school for three years. He then was placed in a special class in the public schools.

B-2's mother, reportedly, has rejected him since infancy and for two years both B-2 and his mother received psychotherapy. Nevertheless, B-2 was placed at Edenwald because of the mutually destructive relationship with his mother as well as his need of a structured, non-pressing environment.

## Diagnosis by staff remedial specialist

The staff remediator, a speech therapist, based his evaluation of B-2 on the psychiatric impression of elective mutism (i.e., "wilence with no physical causes evident or voluntary silence"). In addition, he found that B-2 stuttered with mixed clonic and tonic repetition on initial sounds of words.

On the basis of this evaluation, the remediator recommended developing free interpersonal communication with adults and children. Through increasing his verbal involvements, it was thought that his digit-span and sentence complexity might be increased; however, no report of B-2 having any problem with these areas could be found.

## Diagnosis by investigator

Psychometric. On the Stanford-Binet an IQ of 59 and an MA of 7-9 were obtained. B-2's reading level on the Metropolitan Achievement Test was 2.6, which is approximately the level which would be expected on the basis of his MA.

Psycholinguistic. B-2's pretest profile is presented in Fig. 17. Since B-2 was almost three years below his $\overline{LA}$ of 6-5 on the motor encoding subtest of the ITPA, it was concluded that this was his major disability. His "elective mutism" noted in previous evaluations was not noted in this particular assessment since on the vocal encoding subtest he was only one year below his $\overline{LA}$. B-2 showed a strength in visual decoding on which he obtained a score above the norms of the ITPA.

## Remediation by the staff remedial specialist

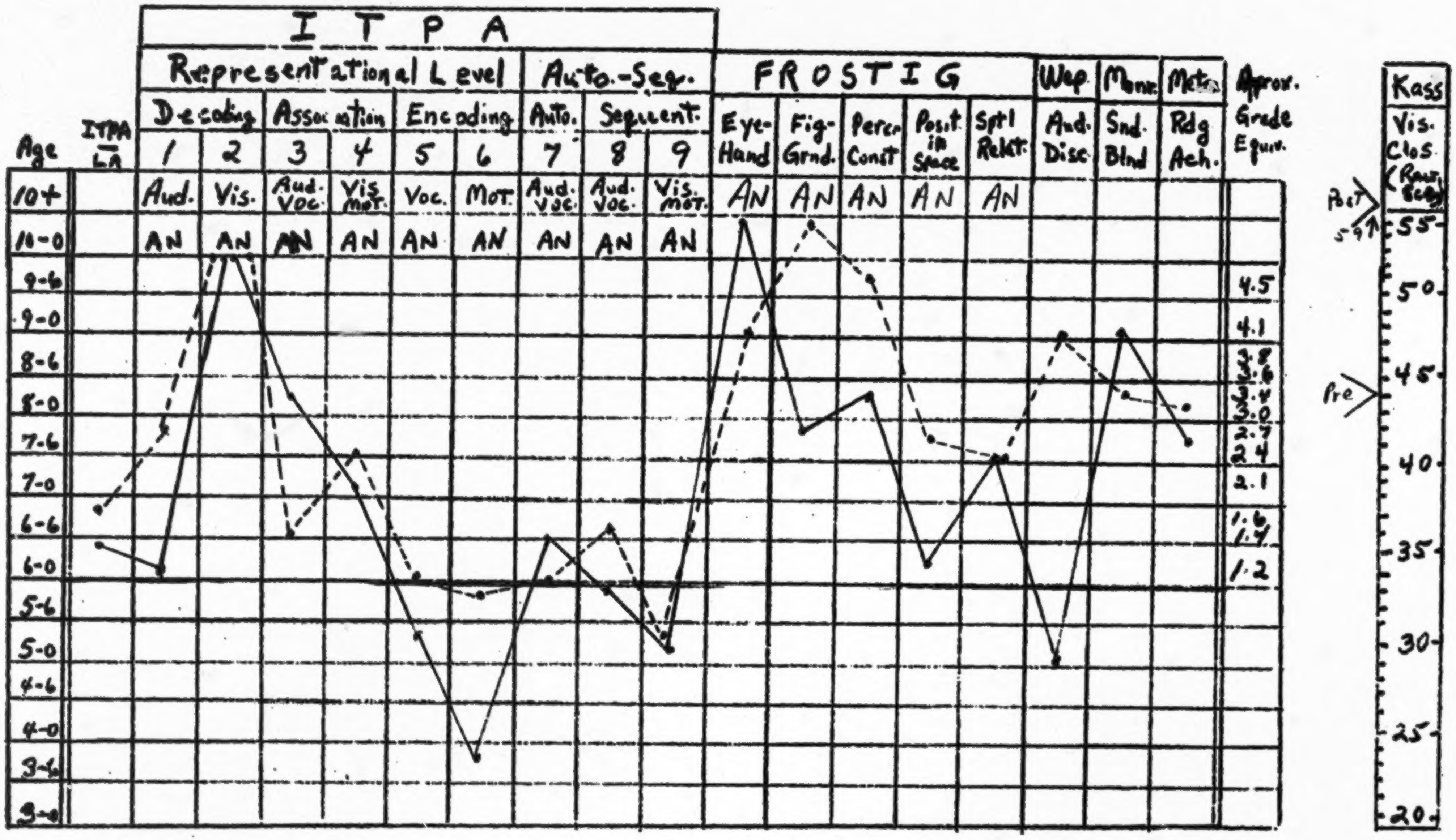
To develop inter-personal communication, the staff remediator and B-2 had informal "chit-chats" over a game of checkers in more than half of the 30 remedial sessions.

In addition, B-2 read into a tape recorder, or played with toys or clay. Practice with digit repetition was given frequently, and at the end of the 30 remedial sessions B-2 could repeat seven digits.

### Post-remediation test results

The posttest results presented in Fig. 17 indicate a two year increase in B-2's level of functioning in his disability area of motor encoding. This increase cannot be attributed to the remediator's treatment as no specific or incidental training in motor encoding appeared to be provided. However, during the remediation period the investigator was informed that B-2 was receiving music therapy. He finger-painted to music and played with various types of musical instruments during these therapy sessions. Of import here is the fact that heavy weighting is given to musical instruments on the motor encoding subtest of the ITPA (i.e., 5 . . . of the 16 subtest items are musical instruments). Of the 27 points possible on this subtest, 11 points may be earned by appropriately handling musical instruments. On the pretest B-2 scored only three of the possible 11 points, while on the posttest he scored 6 of the 11 points. From pre- to posttesting he obtained an over-all increase of 5 points (in raw score), 3 points of which involved tasks with musical instruments. It is possible that the specific experiences provided in music therapy may have been responsible for the increase. Furthermore, it is even possible that B-2 did not have a "true" motor encoding disability, but received a low score because of his limited acquaintance with musical instruments. When his experiences were broadened, his motor encoding score increased.

It is of interest that slight increases in vocal encoding and auditory-vocal sequencing were obtained (i.e., eight month gains in the language ages for both subtests) on posttesting. These were the two areas in which remediation was provided.



Pre-test ——————————   Post-test -------------

Fig. 17. Comparison of pre- and post-test results for B-2.

On pretesting B-2's $\overline{LA}$ was 6-5 and on posttesting it was 6-10. It appears, therefore, that after remediation he was functioning at about the same over-all psycholinguistic level as on pretesting.

### Summary

B-2, a 14 year old boy, was found to have a motor encoding disability on pretesting. The remediation provided by the speech therapist stressed vocal encoding and auditory-vocal sequencing. On posttesting a significant gain in motor encoding was found. This was attributed to the music therapy B-2 was receiving and to the fact that there is a heavy weighting given to music instruments on this subtest of the ITPA.

## CASE B-3

### Background

B-3, a hyperactive, distractible child, had been at Edenwald for 16 months and was 10 years 10 months when pretested for this investigation. He is the younger of two siblings of parents who had been in a concentration camp during World War II.

His mother suffered from tuberculosis during pregnancy with B-3. Although it was a full-term pregnancy, the delivery was reported as very difficult and instruments had to be used. At 7 months B-3 was hospitalized with a high fever and convulsions. He was unconscious for three days, and for two days there was a paralysis of his left side. Until age three and one-half he suffered seizures associated with high fevers. At three and one-half he had a grand mal seizure, and was put on medication.

B-3 was a day care patient at a Child Psychiatry In-Patient Division School of a large hospital for four years. Following this he was placed in a special class for the brain-injured in the public schools.

The inability to adjust to his home environment coupled with inconsistent treatment by his parents were among the reasons for B-3's placement at Edenwald.

Diagnosis by staff remedial specialist

Although it is believed a diagnosis by the staff remedial specialist was made, a search of B-3's cumulative folder showed it was not available.

Diagnosis by investigator

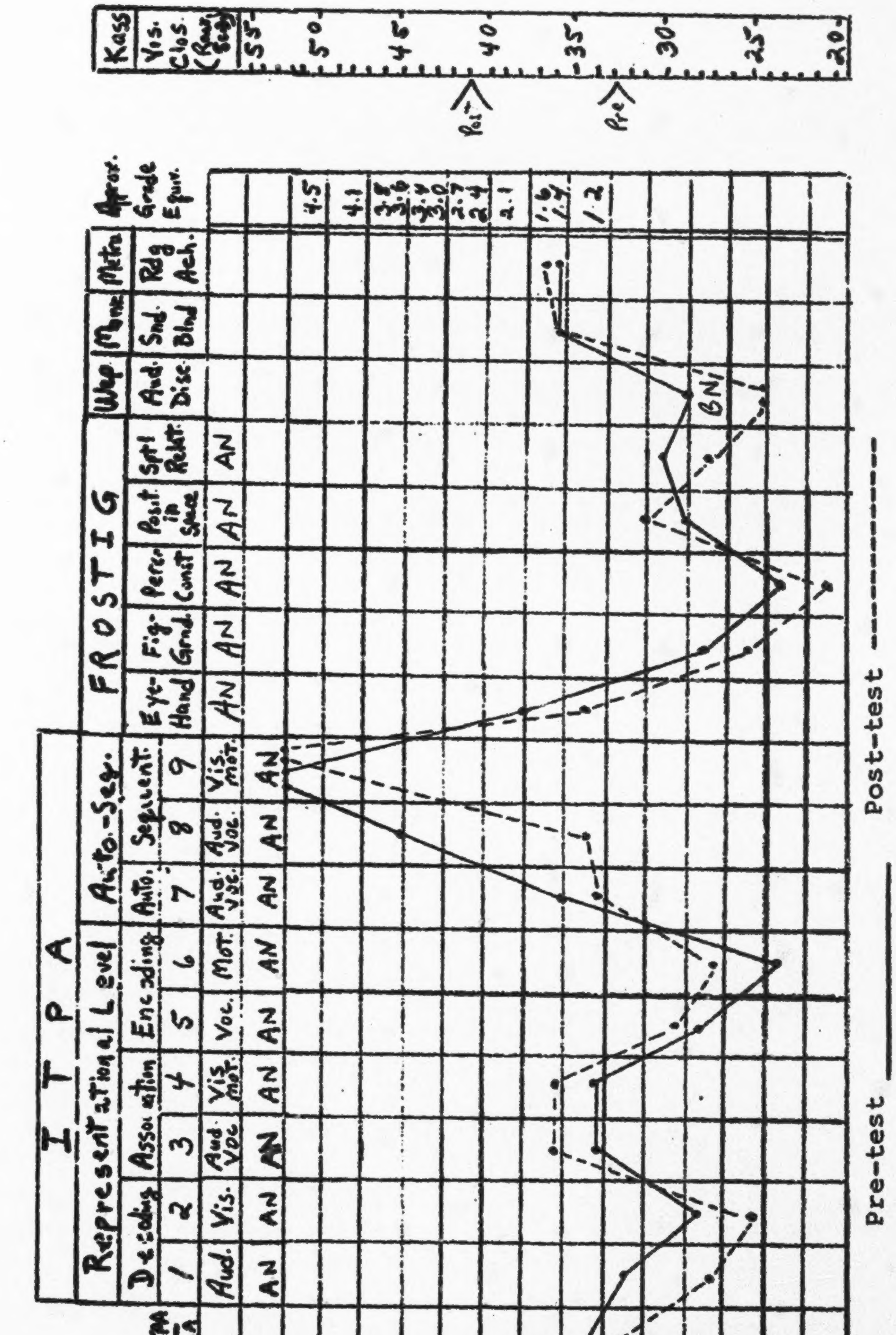
Psychometric. On the Stanford-Binet Intelligence Scale B-3 obtained an IQ of 51 and an MA of 5-3.

On the primary form of the Metropolitan Achievement Test he obtained a reading grade equivalency of 1-4. Although this reading level is commensurate with B-3's obtained MA, he was a non-reader.

Psycholinguistic. From the profile of pretest results presented in Fig. 18, it can be observed that B-3's major disability was in the encoding process as he was significantly below his $\overline{\text{LA}}$ of 6-3 on both the motor encoding (3-10) and vocal encoding (4-9) subtests. He was also low in visual decoding (4-9), and showed practically no sound blending ability as he obtained a raw score of two. On the Frostig battery he scored at the 3-9 age level in perceptual-shape constancy. His most basic deficit, however, seemed to be in the encoding process.

B-3 demonstrated a marked ability in memory processes (both auditory and visual).

An analysis of B-3's profile further reveals that he was low in visual decoding and motor encoding, and he was somewhat higher in the auditory-vocal channel than the visual-motor channel. Such a profile has been found to be characteristic of "Strauss-syndrome" children (Bateman and Wetherell, 1965). Thus, the profile of B-3's learning characteristics plus his hyperactivity and distractibility (noted by previous and present examiners) seem to indicate that B-3 might be classified as a brain injured child exhibiting the "Strauss-syndrome."



Pre-test ——— Post-test - - - - - -

Fig. 18. Comparison of pre- and post-test results for B-3.

### Remediation by staff remedial specialist

The stated goal of B-3's tutor was to provide a developmental reading program. She attempted to build a sight vocabulary and phonics foundation. The materials used in practically every lesson were Bank Street readers, Dolch word cards, and a phonics book entitled, "Phonics We Use." During the 30 sessions B-3 finished one of the Bank Street Readers series and proceeded half-way through another series. Although phonics was stressed, sound blending was not taught. Therefore, the treatment given can best be described as a developmental reading program rather than a remedial program for the amelioration of any learning disabilities.

### Post-remediation test results

From the posttest profile presented in Fig. 18, it should be noted that no significant changes in any of B-3's disabilities were found. The posttest profile is strikingly similar to the pretest profile except for the loss in the auditory-vocal sequencing subtest. This lower score is attributed to B-3's limited attention span. The first examiner (in pretesting) did not report any attention problem; however, the posttest examiner reported that B-3 was somewhat hyperactive and distractible. This, then, may account for the difference in scores obtained in auditory-vocal sequencing.

No improvement in reading was found on posttesting even though the sole emphasis in the remediation was on reading. It is possible that B-3's poor sound blending prevented him from profiting from the reading (especially the phonics) instruction. Hegge, Kirk, and Kirk (1940) recommended the teaching of sound blending as a basis for phonics. This lack of attention to sound blending may have impeded B-3's progress with phonics, and consequently with reading.

### Summary

B-3, a ten year old brain injured boy, showed his most marked disabilities in the encoding process. He showed other deficits in visual decoding, sound blending, and perceptual-shape constancy. His profile was similar to those of a child characterized as having "Strauss-syndrome" characteristics. He was given a developmental reading program (without a foundation of sound blending) by the staff remedial specialist. No changes in his profile or his reading level were evidenced in posttesting. The consistency of his pre- and posttest profiles seemed striking.

## CASE B-4

### Background

B-4 is a boy who, at pretesting, was 14 years 3 months old and had been at Edenwald for 34 months. His delivery and developmental history are reported as normal. B-4 has two younger siblings, one of whom is also in a similar institution.

His mother suffered post-partum psychoses after the birth of each child, and each time she was institutionalized. His father, an unskilled worker, has been described as intellectually limited and dependent.

B-4 spent the first five months of life in an infant home. He had been in and out of foster homes until his placement at Edenwald.

At the age of seven and later at nine, B-4 was enrolled in a special class for the mentally retarded, but was suspended both times for poor adjustment. At the age of ten he entered a special class where he stayed until he was placed at Edenwald. Because of the frequent family break-ups and his uncontrollable behavior, B-4 had little formal schooling.

Because of his mother's third commitment to an institution, his disruptive and bizarre behavior, and the diagnosis of mental retardation and childhood schizophrenia, B-4 was placed at Edenwald.

### Diagnosis by staff remedial specialist

Two years prior to this investigation, the remedial reading specialist who eventually tutored B-4 for this study reported the following results from the tests she administered:

| Test | Score |
|---|---|
| Metropolitan Readiness | |
| Word Meaning | 18 out of 19 correct |
| Sentences | 13 out of 14 correct |
| Information | 14 out of 14 correct |
| Matching | 13 out of 19 correct |
| Reading Readiness | B or High Normal |
| Number Readiness | 17 out of 24 correct<br>B or High Normal |
| Total Readiness | B or High Normal with score falling in 79th percentile |
| Tests for Lateral Dominance | Mixed |
| Gray Oral | No Score |
| Roswell-Chall Diagnostic Test | Knows letter names and sounds of single consonants |
| Gates Diagnostic<br>Phrase Perception | (No specific results listed) |
| Word Perception | (No specific results listed) |
| Auditory Perception | (No specific results listed) |
| Trial lessons | (No specific results listed). |

From these results, the staff remediator concluded that B-4, who should have been reading at the 2.6 level according to his MA and was reading at the primer level, needed remedial reading. From her diagnostic battery she further concluded that B-4 had an ability to learn visually, and that this ability should be used to treat his reading disability. In addition, she found that he had a good foundation of auditory skills (e.g., good rhyming). She identified perceptual and/or motor weaknesses (e.g., poor matching, poor drawing of a man, etc.), and recommended that these be ameliorated.

In this diagnosis both abilities and disabilities were ascertained, and they were related to the remediation recommended. Thus, this evaluation was similar to a learning disabilities diagnosis.

### Diagnosis by investigator

Psychometric. On the Stanford-Binet B-4 obtained an IQ of 52 and an MA of 6-9. He scored at the 2.1 level in reading on the Metropolitan Achievement Test (primary form). This reading level was above the primer level at which he was reading in the diagnosis made two years earlier by the staff remediator. Using his MA of 6-9 as an expected reading level, it was concluded that B-4 did not have a reading problem.

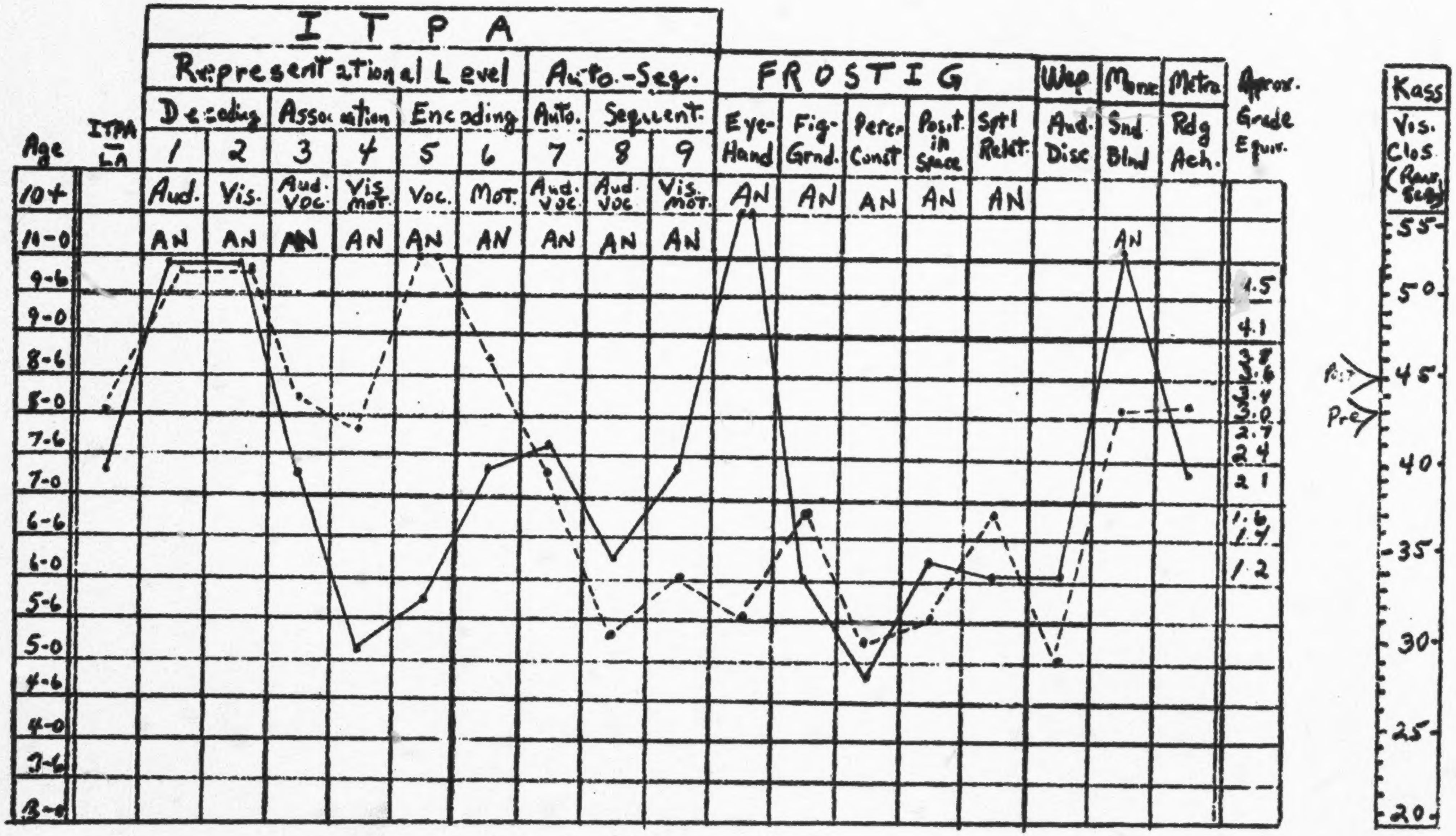
Psycholinguistic. From the pretest profile shown in Fig. 19, it can be seen that B-4 showed a marked disability in visual-motor association. His LA (5-1) was more than two years below his $\overline{LA}$ of 7-4 in this area. He obtained an age equivalency of 4-9 on perceptual-shape constancy; thus, he also had a disability in this area. He exhibited strengths in the decoding process and in sound blending.

These results are similar to those of the staff remedial specialist's. For example, she found that B-4 had an ability to learn visually which is comparable to the high visual decoding score obtained in this investigation. The perceptual-motor weaknesses noted by the remedial reading specialist may be related to the present findings that B-4 evidenced disabilities in visual-motor association and perceptual-shape constancy.

### Remediation by staff remedial specialist

The staff remediator stated that she intended to teach B-4 reading through a visual-motor method. She attempted to use his visual abilities to ameliorate his reading disability. The following were the activities which were stressed by the staff remediator:

1. Visual discrimination of words with similar configurations by having B-4 look at the word, say it, and then write it (i.e., the visual-motor method).
2. Spelling of words by the visual-motor method.
3. Discrimination of words, in terms of same or different, with motor and vocal responses.



Pre-test ———————— Post-test -----------

Fig. 19. Comparison of pre- and post-test results for B-4.

4. Crossword puzzles in which B-4 had to fit a word into the puzzle on the basis of meaning and configuration cues.
5. Anagrams in which one letter had to be changed by B-4 to make other meaningful words from definitions provided.
6. Word categorization in which B-4 had to find words which didn't meaningfully belong to a group of other words.

Secondary emphasis was given to teaching reading through a phonics approach. The Hegge, Kirk, and Kirk Remedial Reading Drills were used so that B-4 could use his auditory abilities to increase his reading disability.

It seems that a systematic remedial program comparable to that used with the learning disabilities approach was provided by this staff remediator to B-4.

Post-remediation test results

The posttest profile pictured in Fig. 19 shows that B-4 increased by two and one-half years his visual-motor association score. Hence, he functioned, on posttesting, at his expected level in this area. No change in his perceptual-shape constancy disability was found. His reading grade increased one year from 2.1 to 3.1.

B-4's improved reading and visual-motor association scores can be attributed to the remediation given by the staff remediator. Many of the remedial activities are viewed as training for visual-motor association with words rather than pictures as is usually done (e.g., the crossword puzzles, word categorization activities, etc.). It is possible, then, that B-4 improved in visual-motor association with words, and this ability transferred to picture material which is used on the visual-motor association subtest of the ITPA. In addition, B-4's increase in reading may be attributed to the utilization of his abilities of sound blending and visual decoding in the remedial reading provided. The lack of increase in perceptual-shape constancy is attributed to the fact that no remedial attention was given to this area.

B-4's loss of four years in the eye-hand coordination subtest is noteworthy and so is his increase of four years in vocal encoding. His $\overline{LA}$ went from 7-4 on pretesting to 8-0 on posttesting. Thus, on an over-all level B-4 did show somewhat of an increase in psycholinguistic functioning.

### Summary

B-4, a 14 year old boy, exhibited marked disabilities in visual-motor association and perceptual-shape constancy on pretesting. In the remediation provided by the staff remediator it appeared that his visual-motor association deficit was ameliorated as a visual-motor method of teaching reading was stressed. No improvement in perceptual-shape constancy was found. This area was not stressed in remediation. The diagnosis and remediation provided by the staff remediator seemed to be similar to the learning disabilities approach.

## CASE B-5

### Background

B-5 is a girl who was 14 years 1 month of age and had been at Edenwald for 26 months when pretested. During birth her mother suffered an asthmatic attack, and had to deliver sitting up. Shortly after B-5's delivery, her mother died from complications associated with a respiratory disorder.

B-5 was born with an enlarged thymus gland and an umbilical hernia. Developmentally, she was slow to master the tasks of walking and talking. Her health has been poor as evidenced by her history of rickets, hypothyroidism, and three surgical operations to straighten her left eye.

For the first two years of life she lived in an infant home. Although her father re-married, his wife did not want B-5; therefore, she was placed in a foster home at age three, in which she lived until her placement at Edenwald.

B-5 was in a special class for the mentally retarded from age 7 to age 12 at which time she was placed at Edenwald because her foster parents could no longer cope with her disruptive behavior. Thus, B-5 has been in placement all of her life.

Diagnosis by staff remedial specialist

One year prior to this investigation the staff remediator who eventually tutored B-5 in this study obtained the following test results from her diagnosis:

| Test | Score |
|---|---|
| Gray Oral | 2.6 |
| Roswell-Chall | Knows consonant sounds. Phonic knowledge fragmentary. |
| Gates Primary Word Recognition | 2.8 |
| Gates Primary Paragraph Reading | 2.7 |
| Sample Passages in Basal Reading | Beginning 3rd grade |
| Frostig Visual Perception Test | Age Equivalencies |
| Eye-motor Coordination | 6.3 |
| Figure-ground Relations | 5.3 |
| Position in Space | 5.6 |
| Spatial Relations | 5.3 |
| Perceptual-shape Constancy | (Not administered). |

On the basis of a fourth grade expectancy level, it was concluded that B-5 had a reading problem.

The remediator found that B-5 had some abilities in the auditory areas and disabilities in the areas of visual perception. On the basis of her findings it was recommended that the following be given:

1. A systematic reading program based on a phonics approach.

2. Training in visual and sensory perception using the Montessori and Kephart exercises.

Diagnosis by investigator

Psychometric. On the Stanford-Binet B-5 obtained an IQ of 68 and an MA of 9-0. She obtained a reading grade of 2.5 on the elementary form of the Metropolitan Achievement

Test. This was about the same reading level as was reported by the staff remediator one year earlier.

Psycholinguistic. From the profile of results shown in Fig. 20, it can be observed that B-5's basic deficit was in auditory-vocal sequencing. She obtained a $\overline{\text{LA}}$ of 4-7 on this subtest which was significantly below her $\overline{\text{LA}}$ of 7-1.

Some discrepancies were found between the Frostig scores obtained by the staff remediator and those obtained by the investigator one year later. B-5 scored much higher on figure-ground relations and lower on position in space when the investigator administered this test. If the highest Frostig scores are considered, it can be concluded that B-5 does not have a disability in visual perception.

From her high scores on auditory decoding, sound blending, and auditory discrimination, it appeared that B-5 had an asset in the auditory-vocal channel with the exception of auditory-vocal sequencing.

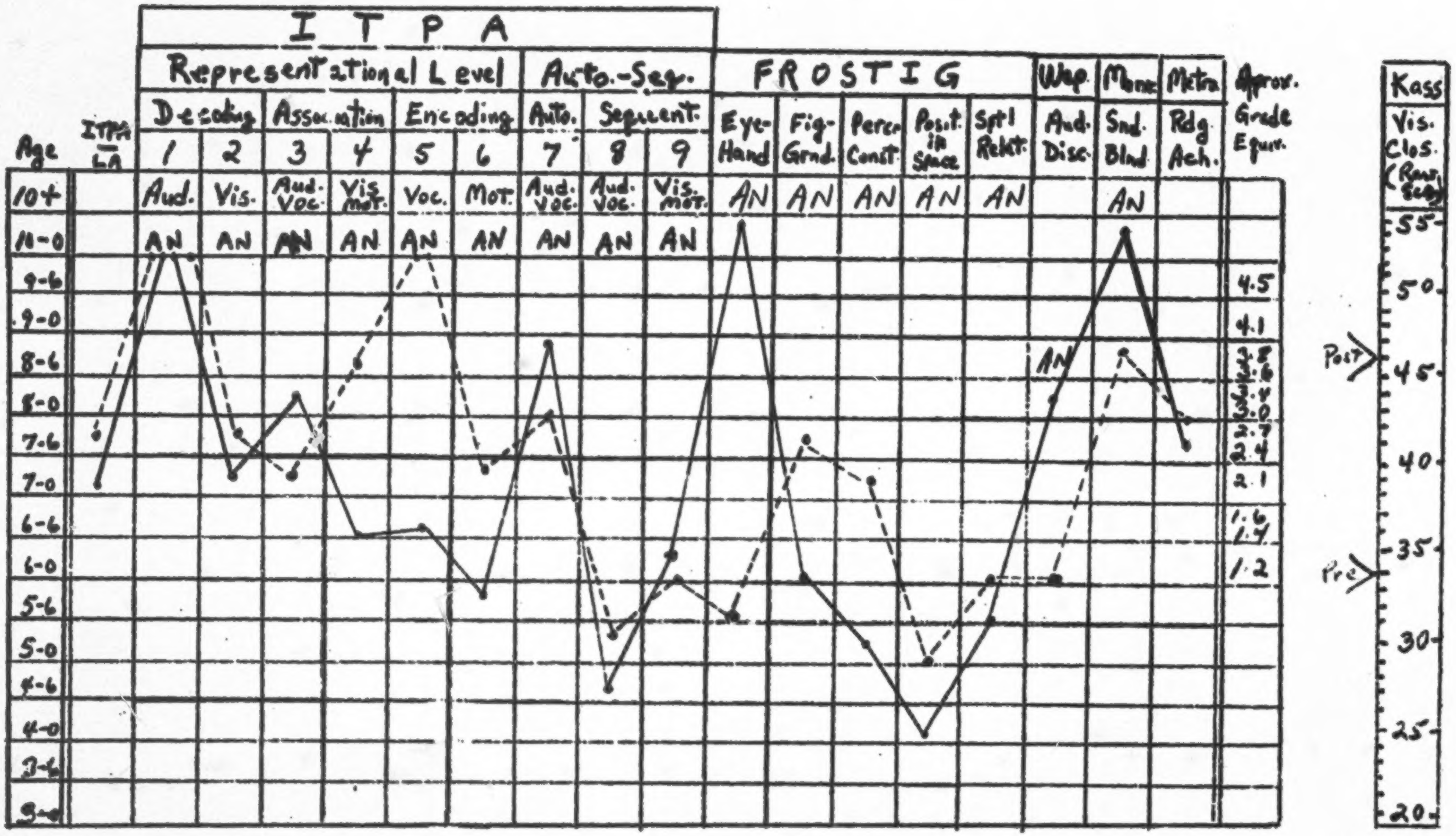
### Remediation by staff remedial specialist

B-5 received a developmental reading program. Most of the lessons involved silent and/or oral reading of a story book or text followed by comprehension questions. In about one-third of the lessons some attention was given to phonics.

The remediator's own recommendations for remediation (i.e., training in phonics and in visual perception) were not implemented.

### Post-remediation test results

From her posttest profile presented in Fig. 20, it can be noted that B-5 made a gain of nine months in her LA in auditory-vocal sequencing. Her posttest $\overline{\text{LA}}$ of 5-4 on this subtest was significantly below her posttest $\overline{\text{LA}}$ of 7-9. Therefore, it seems that there was no significant change in B-5's major deficit area of auditory-vocal sequencing. She showed sizable gains in vocal encoding, motor encoding, and visual-motor association; however, these were not disability



Pre-test ———————— Post-test -----------

Fig. 20. Comparison of pre- and post-test results for B-5.

areas for her on pretesting. Much variability between the pre- and posttest Frostig scores was found. The assets in auditory discrimination and sound blending identified in pretesting were not found on posttesting as much lower scores were found for these areas. In summary, her pre- and posttest profiles showed marked variability.

No significant increase in reading was obtained even though this was exclusively stressed in the treatment given B-5.

## Summary

B-5, a 14 year old girl, was found to have a deficit in auditory-vocal sequencing. The treatment given by the remedial specialist was a developmental, non-specific reading program which had no relationship to the diagnosis or recommendations for remediation originally made by the staff remediator. This treatment did not seem to benefit B-5 as no gains in auditory-vocal sequencing or reading were found on posttesting.

## CASE C-1

### Background

C-1 is a girl who was 14 years 3 months old at pretesting and had been at Edenwald for 21 months. Her early history related that her delivery was normal, but she showed delayed motor and speech development. Medically, her record reveals the following: at age four she had convulsions; however, her EEG was reported as normal; at the age of eight, her EEG was found to be abnormal; and when she was ten the diagnosis of a "heredo-familial degenerative disorder" was made. The current diagnosis, recently reported, was of a possible abortive type of Tay-Sachs disease.

C-1 is the youngest of three children. One older sibling had been in an institution for the emotionally disturbed, and another is mentally retarded. Her mother has been described as paranoid schizophrenic. Her fath had been in an institution for the mentally retarded and later in a correctional institution. The relationship between C-1 and her mother was described as one of constant conflict. For one year C-1 had been placed in a home for girls. Because of her poor adjustment to school and with the girls in the home, she was transferred to Edenwald.

### Diagnosis by staff remedial specialist

Two evaluations were made of C-1. The first evaluation was done upon C-1's admission to Edenwald. Although the original report of this diagnosis was not available, a summary was found in a report made one year prior to this study. The report noted the following grade equivalencies: 7.8 in spelling; 6.5 in oral reading; and 3.9 in comprehension. Her reading expectancy was fifth grade, and the remedial specialist believed C-1's reading ability to be above this level and her comprehension slightly below this level. The remediator stated that C-1 had the potential to function at the dull normal level since she obtained a verbal IQ of 87, and thus maximal intellectual stimulation was recommended.

Several months prior to this investigation the second evaluation of C-1 was made because of discrepancies found between C-1's group test scores and her earlier test scores obtained on an individual basis. The following test results were obtained:

| Test | Score |
|---|---|
| Gray Oral | 7.3 |
| Gates Reading Survey | |
| Speed | 6.3 (accuracy 90%) |
| Vocabulary | 5.4 |
| Comprehension | 4.3 |
| Average | 5.3 |
| Gates Basic Reading Tests | |
| Understanding Precise Directions | 7.2 |
| Appreciating General Significance | 7.2 |

On the basis of her verbal IQ, C-1 should have been reading at the mid-fifth grade level. Since her test scores ranged from 4.3 to 7.3, she was reading at or above her expected level. The remediator reported that C-1's reading comprehension deteriorated after short periods, and she attributed this to fatigue or tension build-up during reading.

The remediator also attributed C-1's uneven level of functioning on the group and individual tests to her organic or emotional problem. It was recommended that comprehension should be stressed in her regular reading program in school.

## Diagnosis by investigator

Psychometric. C-1 obtained an IQ of 70 and an MA of 9-6 on the Stanford-Binet. She obtained a reading grade of 3.6 on the elementary form of the Metropolitan Achievement Test, which is a much lower score than those obtained by the staff remediator on an individual basis. Since C-1 scored lower on group achievement tests in school also, it was possible that she obtained a lower reading score in this investigation because this test was administered to children in small groups.

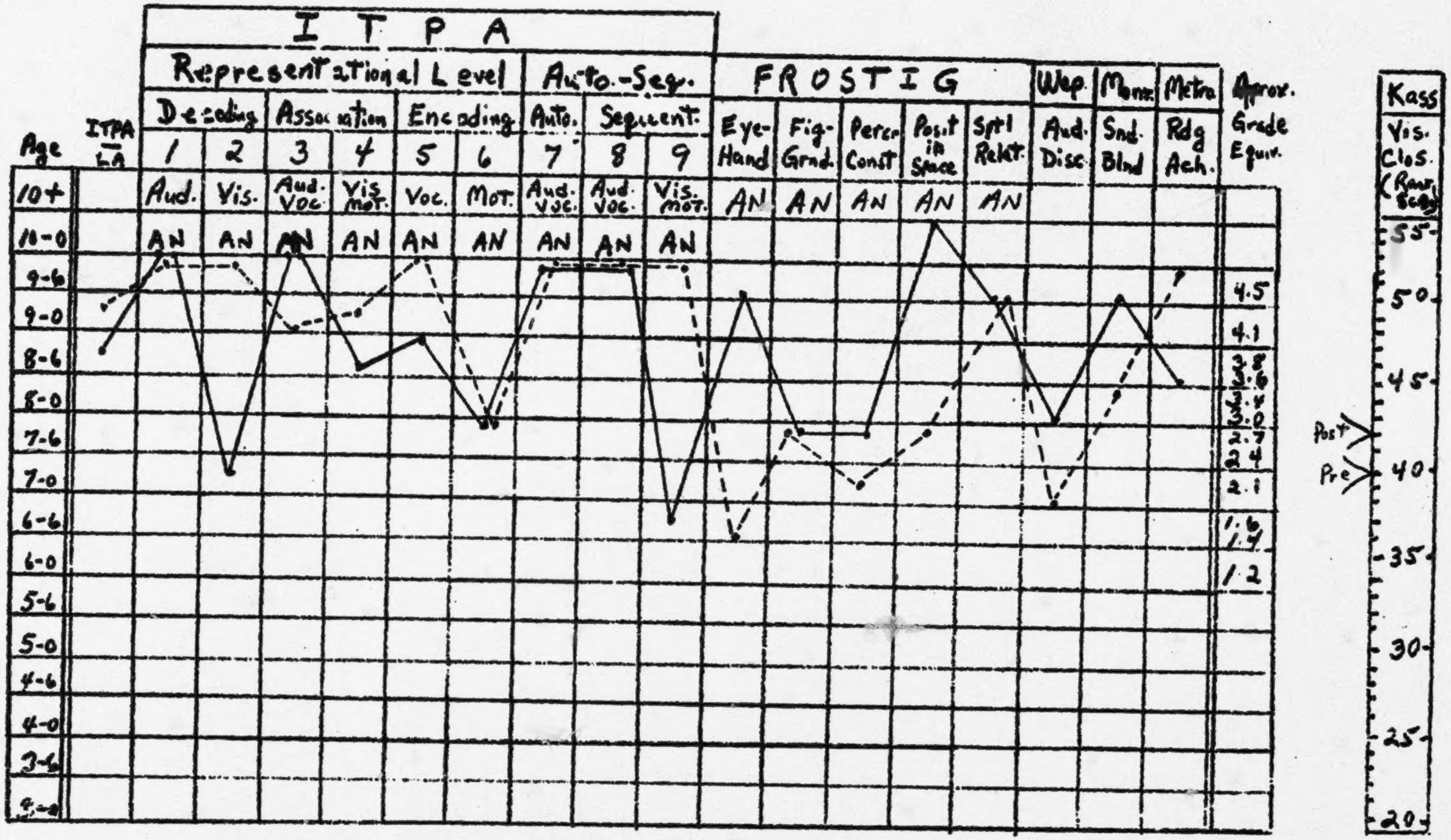
Psycholinguistic. C-1's pretest profile is shown in Fig. 21. The major deficit found was visual-motor sequencing in which she obtained a LA of 6-9, two years below her $\overline{\text{LA}}$ of 8-9. She was also low in visual decoding, but this was not considered a major deficit. An asset in the auditory-vocal channel was found.

## Remediation

No remediation was given C-1.

## Post-remediation test results

C-1's posttest profile is presented in Fig. 21. Her visual-motor sequencing LA on posttesting was above norms, two years above her pretest LA of 6-9. She also showed a two year increase in visual decoding. Much variability was



Pre-test ——————— Post-test ------------

Fig. 21. Comparison of pre- and post-test results for C-1.

shown on two of the five Frostig subtests in that she decreased three years in eye-hand coordination and two years in position in space. Her scores in sound blending and auditory discrimination went down one year while her reading grade went up one year on posttesting. Therefore, a considerable amount of discrepancy was found in her pre- and posttest profiles. These discrepancies were not consistent as evidenced by increases in some areas and decreases in others. No pattern or reason for change could be determined.

Her posttest score on the visual-motor sequencing subtest is most likely representative of her ability in this area during pretesting. The low pretest score in visual-motor sequencing, and also in visual decoding, then, is apparently related to her inconsistent performance on both testings. Furthermore, the variable pre- and posttest results obtained in this investigation seem to be related to the fact that, priot to this study, C-1 performed inconsistently on school achievement tests and on the remedial reading test battery. Thus, it is possible that because of the nature of her emotional problem, C-1 does not perform at her maximum level on a consistent basis.

### Summary

C-1, a 14 year old girl, exhibited a visual-motor sequencing deficit on pretesting. No remediation was given C-1. On posttesting she evidenced a significant increase in her visual-motor sequencing score. Her pre- and posttest profiles were quite discrepant. It was proposed that the nature of C-1's emotional problems causes her to perform inconsistently from test to test.

## CASE C-2

### Background

C-2 was 9 years 5 months of age and had been at Edenwald for only 3 months when he was pretested. His delivery was reported as normal. At the age of 2 he started to show withdrawn behavior.

C-2 has one older sibling who is in a state school for the mentally retarded. His mother was described as fearful and dependent; his father served some time in a correctional institution, and psychiatric care was recommended. Because of parental neglect, C-2 was placed in a foster home for two and one-half years until he was placed at Edenwald.

Although he had been recommended for a special class for the mentally retarded, he was kept in a regular class until his placement at Edenwald.

He was admitted to Edenwald because of his inability to cope with the demands of school and to relate to adults and to his peers. In a psychiatric evaluation of C-2 it was concluded that his "major pathology is a tremendous apathy which pervades his entire personality and impairs his intellectual and motor functioning."

### Diagnosis by staff remedial specialist

Upon his admission to Edenwald, C-2 had been evaluated by a remedial specialist. The following are the test results which were reported:

| Test | Score |
|---|---|
| Gray Oral | 4.5 |
| Gates Advanced Primary | |
| Word Recognition | 3.4 |
| Paragraph Reading | 2.8 |
| Roswell-Chall | (No specific results given). |
| McCall-Crabbs Standard Test Lessons | (No specific results given). |

On the basis of his MA, C-2 should have been reading at the beginning first grade level. However, his reading level was found to be nearer to his CA (i.e., 9-2) than his MA; therefore, he was reading at an advanced level. It was also found that he had good phonetic skills on the basis of the Roswell-Chall Diagnostic Test. No help in reading was thought necessary.

### Diagnosis by investigator

Psychometric. C-2 obtained an IQ of 65 and an MA of 6-3 on the Stanford-Binet. On the primary form of the Metropolitan Achievement Test he obtained a reading grade of 2.8 which compared similarly to the results found by the staff remediator.

Psycholinguistic. The pre-remediation profile is shown in Fig. 22. C-2 was significantly below his $\overline{\text{LA}}$ of 5-5 on the motor encoding subtest on which he obtained a LA of 2-3. This disability may be related to his extremely poor gross and fine motor coordination noted in all previous evaluations. His assets appeared in eye-hand coordination, sound blending, and auditory discrimination. The two latter areas compare favorably with the staff remediator's findings of good phonetic skills.

### Remediation

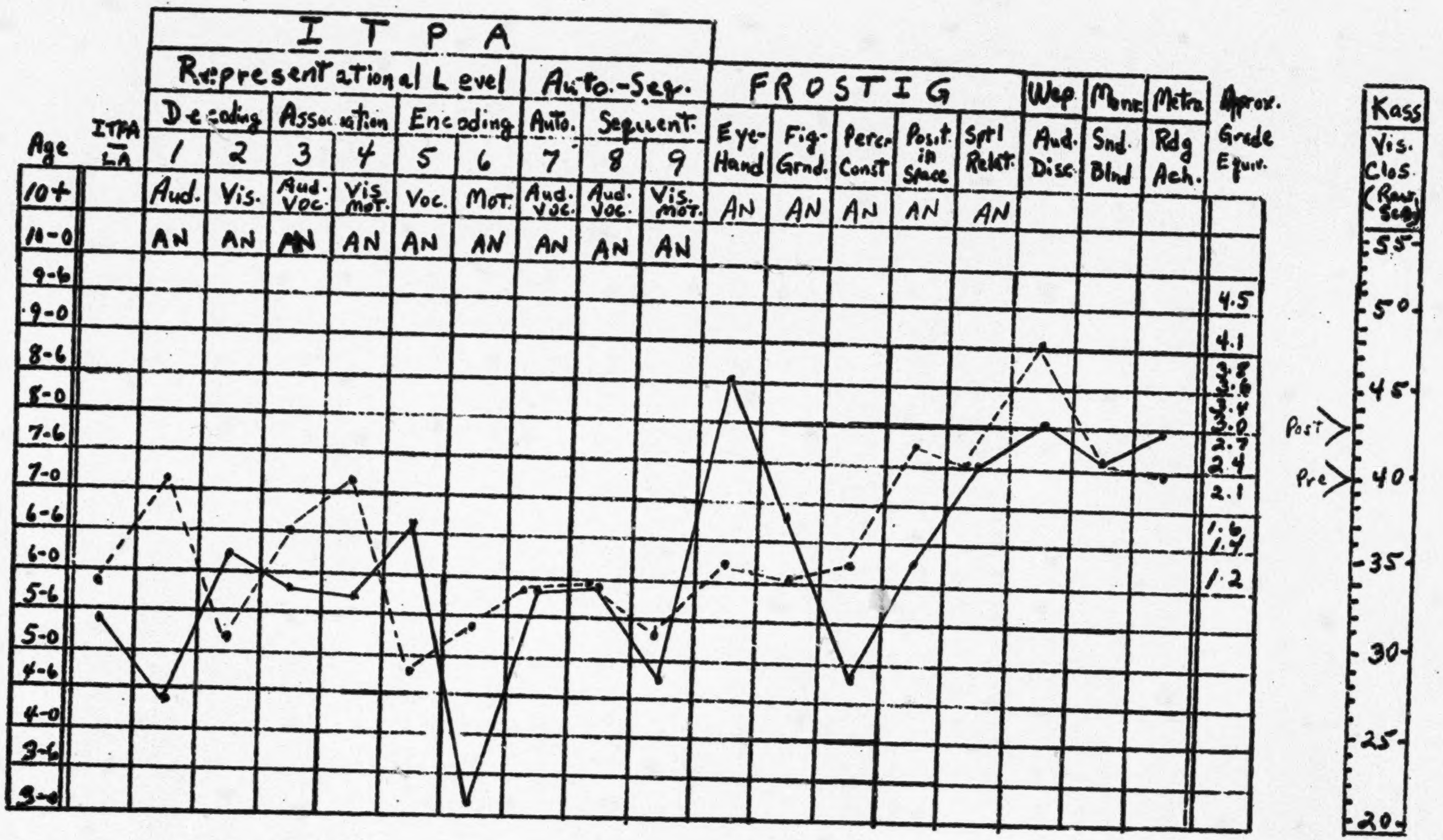
No remediation was given to C-2.

### Post-remediation test results

The post-remediation test results for C-2 presented in Fig. 22 show variability between the pre- and posttest profiles. In his deficit area of motor encoding, C-2 increased two years on posttesting. In addition, he evidenced substantial gains of at least one and one-half years in auditory decoding, position in space, and perceptual-shape constancy. Conversely, he obtained considerably lower posttest scores on vocal encoding and eye-hand coordination.

### Summary

C-2, a nine year old boy who had been at Edenwald for three months, exhibited a motor encoding deficit on pretesting. Although he received no remediation, his posttest motor encoding LA increased by two years. Considerable variability from pre- to posttest profiles was found.



Pre-test ——————— Post-test ------------

Fig. 22. Comparison of pre- and post-test results for C-2.

# CASE C-3

## Background

C-3 is a boy who was 15 years 2 months old at pretesting and had been at Edenwald for 19 months. His birth history was reported as normal, but his development was slow. At age four, he was not yet toilet trained, used a very small vocabulary, and was described as morose and withdrawn.

He lived with his mother and older sibling until the age of four, at which time he was placed in an infant home because of his mother's inability to care for him due to her intellectual and emotional limitations. At age four and one-half he was placed in a foster home where he remained for only four months because of marital friction between the foster parents as well as their disappointment with C-3. He stayed four years with a second foster placement until his foster mother suffered a heart attack. After one year in a third foster home, he was placed in an institution for emotionally disturbed children. He was transferred to this institution because of his need for a structured environment which he could not seem to get from a foster home. After four years in the former institution, he was transferred to Edenwald because of his need for an intellectually less threatening setting.

## Diagnosis by staff remedial specialist

Upon entering Edenwald, C-3 was evaluated by the remedial reading specialist. The following test results were obtained:

| Test | Score |
|---|---|
| Gray Oral | 3.2 |
| Gates Advanced Primary | |
| Word Recognition | 4.1 |
| Paragraph Reading | 4.4 |
| Roswell-Chall | Good grasp of word analysis skills |
| Basal Reader - Sample Passages | $4^2$ level with ease, up to $6^1$ with few errors |
| Gates Reading Survey | |
| Speed | 3.6 |
| Comprehension | 3.1 |

Since C-3 came close to his expected reading level of 4.8 on the Gates Reading Survey, the remediator concluded that no remedial reading was needed. She found his phonetic skills to be good; however, a problem with comprehension was indicated.

### Diagnosis by investigator

Psychometric. On the Stanford-Binet C-3 obtained an IQ of 57 and an MA of 8-0. On the elementary form of the Metropolitan Achievement Test he obtained a reading grade of 2.7. This was somewhat lower than the reading level obtained by the staff remedial specialist. However, since it was close to his MA, no reading problem seemed to be evidenced.

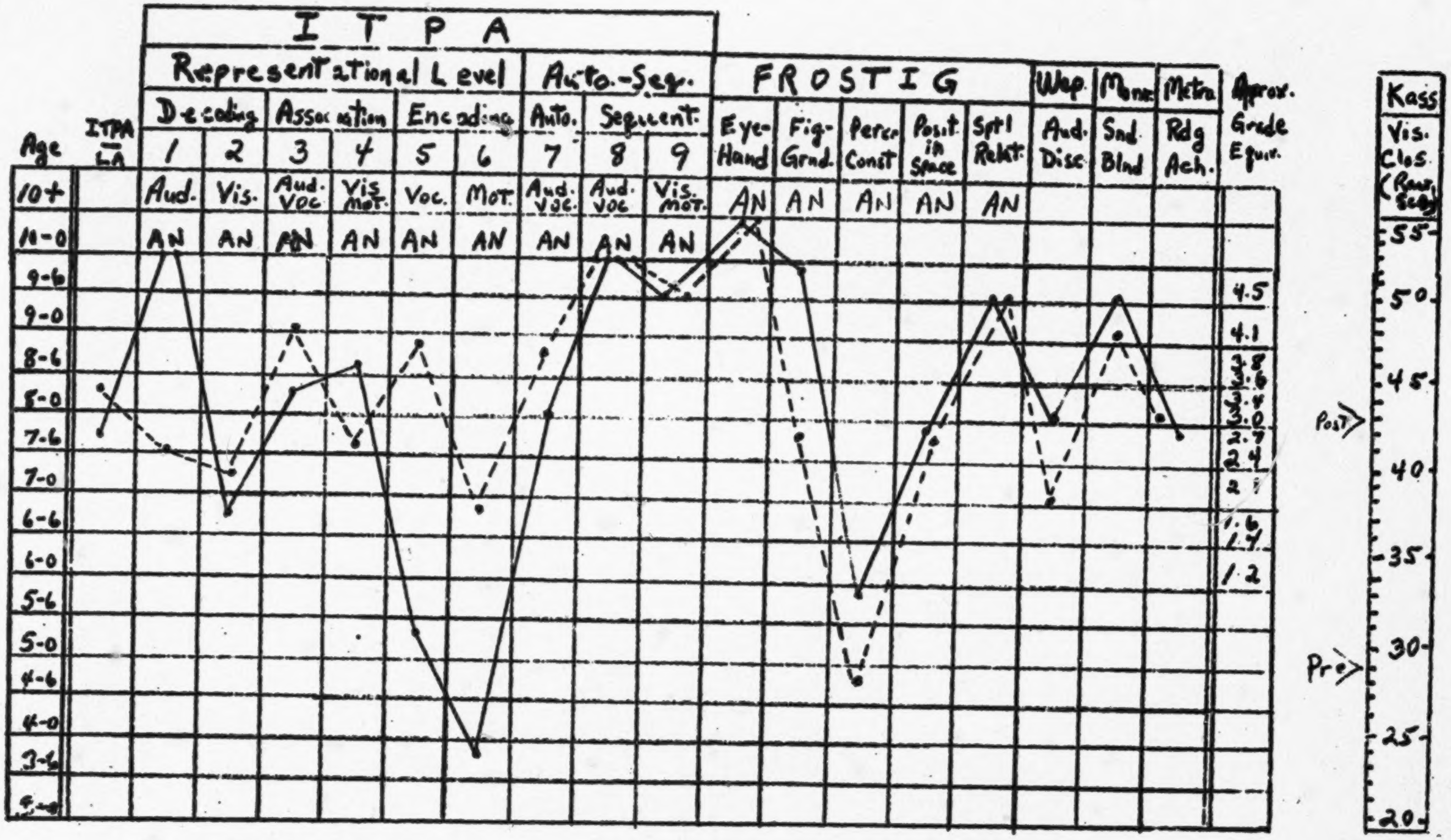
Psycholinguistic. C-3's pretest profile, presented in Fig. 23, shows that he scored significantly below his $\overline{LA}$ of 7-8 on motor encoding (3-10) and vocal encoding (5-4). This encoding disability was most pronounced in motor encoding. In addition, he was also deficient in perceptual-shape constancy and visual closure (as compared with the lowest raw score of 20 for all 32 *S*s). He appeared to have assets in both of the sequencing areas, auditory decoding, sound blending, eye-hand coordination, and figure-ground relations. His pretest profile is marked by extreme peaks and valleys.

### Remediation

No remediation was given to C-3.

### Post-remediation test results

C-3's posttest profile, presented in Fig. 23, shows a gain of three years in the vocal encoding and the motor encoding subtest, areas which were his major disabilities on pretesting. His score in his deficit area of perceptual-shape constancy remained unchanged. He improved in visual closure which might be attributed to a learning factor (i.e., practice effect) since the same form of the test was used in pre- and posttesting. In general, the pre- and posttest profiles, excluding these areas of change, are otherwise quite similar and consistent.



Pre-test ———— Post-test ------------

Fig. 23. Comparison of pre- and post-test results for C-3.

During the period of the investigation, C-3 obtained his first job. It is possible that C-3 was called upon to express himself both vocally and motorically in this training as well as in his new role as a worker. Therefore, this vocational experience may have been responsible for his increased scores in his deficit areas.

Summary

C-3, a 15 year old boy, exhibited an encoding disability on pretesting. He received no remediation. On posttesting he showed significant increases in both encoding subtests. It was suggested that these gain scores might have been due to his recent experiences in acquiring a job. The remainder of his profile was consistent from pre- to posttesting.

## CASE C-4

Background

C-4 had been at Edenwald for 37 months and was 14 years and 9 months old when he was first tested for this investigation. Although his mother reported that he was born with the umbilical cord around his neck and he was blue, no medical verification of this could be ascertained from his record.

C-4 is the third of four children. All are described as emotionally disturbed, and two were in the process of being removed from the home. His parents separated when he was six years old. His father, who is reported as being alcoholic, epileptic, and mentally ill, lives in another part of the country. His mother is described as schizophrenic. The family lived with the maternal grandfather after the father's departure. The grandfather reportedly hit and criticized C-4's mother in front of the children.

C-4 had been in regular classes and repeated second grade. In fourth grade his behavior had become very disruptive.

He was placed at Edenwald because of his need to be separated from a pathological home environment.

### Diagnosis by staff remedial specialist

Upon entering Edenwald, C-4 was evaluated by one of the remedial specialists, who obtained the following test results:

| Test | Score |
|---|---|
| Gray Oral | 0 (Fails to score) |
| Sample Passage in Basal Reader | Cannot read low first grade independently |
| Roswell-Chall | Knows most consonants, but no sound |
| Gates Primary Word Recognition | 2.0 |
| Gates Diagnostic | |
| Phrase Perception | High first grade |
| Untimed Word Perception | High first grade |
| Blending Letter Sounds | Rudimentary ability |
| Giving Words with Initial Sounds | Rudimentary ability |

According to his MA on a previous psychological evaluation C-4 should have been reading at the mid-first grade level. The remediator believed that he read at the preprimer level and obtained higher scores because of guessing and use of picture cues. His visual retention was described as variable. Although he showed some auditory readiness, his responses were reported as slow. No remedial reading was recommended because it was thought that it would be too hard to reach him.

One year after the above diagnosis, another evaluation was made to ascertain whether C-4 had made any reading progress. The following test results were obtained:

| Test | Score |
|---|---|
| Gray Oral | 0 (Mis-read identical words as in earlier diagnosis |
| Gates Primary | |
| Word Recognition | 2.0 |
| Paragraph Reading | 1.7 |
| Roswell-Chall | Start in phonics made: possesses sounds of most beginning consonants and several blends |

| | |
|---|---|
| Gates Diagnostic | |
| Phrase Perception | 2.8 |
| Word Perception | 2.0 |
| Auditory Perception (4 subtests) | Beginning auditory readiness |
| Barger's Test for Lateral Dominance | No mixed dominance |
| Frostig Developmental Test of Visual Perception | |
| Eye-hand Coordination | All scores within range of normal for his MA |
| Figure-Ground Relations | |
| Position in Space | |
| Spatial Relations | |
| Perceptual-Shape Constancy | (Not administered). |

No progress was found in oral reading, word recognition, and auditory perception. Some improvement was noted in basic sight phrases and beginning phonics. He read at the mid-first grade level which is the same level found in the earlier evaluation. He read two years below his MA expectancy. His lack of progress was attributed to poor motivation. C-4 was not recommended for remedial reading because he had not made enough reading progress in the classroom.

### Diagnosis by investigator

Psychometric. On the Stanford-Binet C-4 obtained an IQ of 62 and an MA of 8-2. On the primary form of the Metropolitan Achievement Test he obtained a reading grade of 2.5. This is comparable to the results obtained in the second diagnosis by the staff remediator. Judging by his MA of 8-5, C-4 was reading about one year below expectancy.

Psycholinguistic. C-4's pretest profile is presented in Fig. 24. He scored significantly below his $\overline{LA}$ of 7-9 on the visual-motor association test on which he obtained a LA of 5-9. Although he was below his $\overline{LA}$ on position in space (6-3), this was not considered a basic deficit area as was visual-motor association. The findings for the other Frostig subtests, except for perceptual-shape constancy which was not given by the staff remediator, were similar to the remediator's findings.

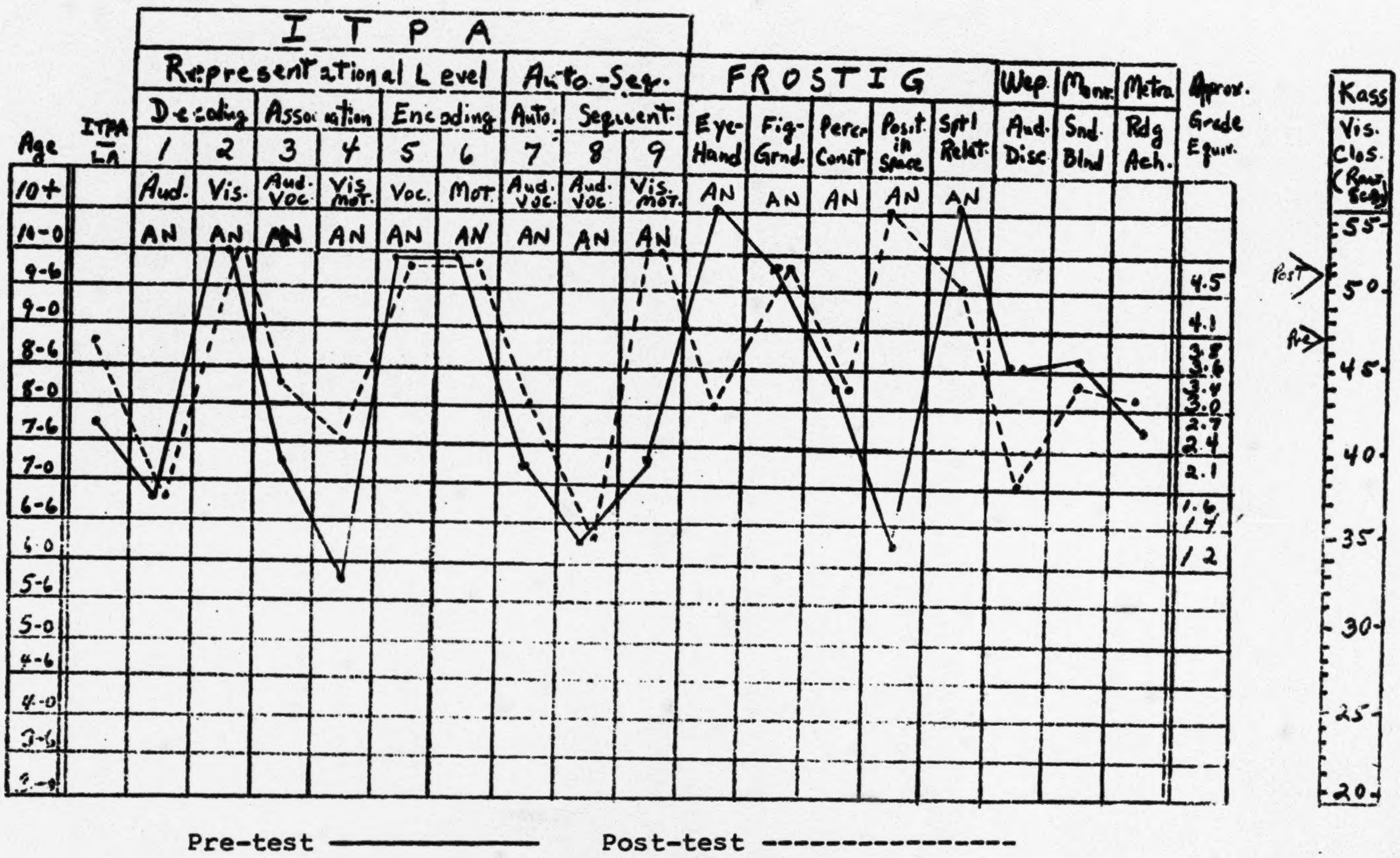


Fig. 24. Comparison of pre- and post-test results for C-4.

Assets were found in visual decoding and in both encoding areas. He obtained a perfect raw score on the Wepman Auditory Discrimination Test.

### Remediation

No remediation was given to C-4.

### Post-remediation test results

Fig. 24 depicts the posttest profile of C-4. He showed a two year increase in visual-motor sequencing and a 21 month gain in his deficit area of visual-motor association. He also made a four year gain in position in space. Thus, with no remediation C-4 increased in his deficit area.

C-4's posttest $\overline{\text{LA}}$ (8-10) was a year greater than his pretest $\overline{\text{LA}}$ (7-9); thus, there seems to have been an increase in his over-all level of psycholinguistic functioning.

### Summary

C-4, a 14 year old boy, exhibited a visual-motor association deficit on pretesting. Although no remediation was given, he showed significant gains in visual-motor association and in visual-motor sequencing. Both areas of gain involved the visual-motor channel.

## CASE C-5

### Background

C-5, a boy of 15 years and 9 months, had been at Edenwald for five months at the time of pretesting. His delivery was described as normal, but he is reported as having been hyperactive as well as slow to develop in self care.

C-5 is the younger of two children. Both parents worked, and he was left alone much of the time.

His school history shows that he attended a day class at a private special school for three years; he was discharged from kindergarten and from a class for the brain injured; and one year he received home instruction because there was no room in a special class for the mentally retarded.

The parents were reported as finding it very difficult to give C-5 consistent and adequate management, therefore placement at Edenwald was recommended.

Diagnosis by staff remedial specialist

C-5 was tested by a staff remedial specialist upon his admittance to Edenwald. The following test results were reported as a result of this diagnosis:

| Test | Score |
|---|---|
| Gates Primary, Word Recognition | 1.4 |
| Gray Oral | 0 |
| Metropolitan Readiness | |
| Reading Readiness | B or High Normal |
| Number Readiness | A or Superior |
| Total Readiness | A or Superior, falling in the 96th percentile |
| Draw-a-Man | D or Below Average |
| Roswell-Chall Diagnostic | Knows names of many letters and a few consonant sounds |

The following tests were administered, but no specific results were reported: Roswell-Chall Auditory Test; three subtests of the Gates Diagnostic Test; trial lessons; and parts of the Barger and the Harris Laterality Tests.

The remediator concluded that C-5 had a reading problem since he was a non-reader and should have been reading at the third grade level in accordance with a previously obtained MA. From the readiness test results, it was thought that C-5 was "ready" to learn to read.

No visual-motor problem was found which was interpreted by the remediator as being at odds with the boy's very obvious poor motor coordination. From trial lessons the remediator found that C-5 could not learn to read by a visual method, a visual-motor method, or an auditory method.

The remedial specialist did not recommend C-5 for remedial reading because of his severe emotional disability and neurological problem (as evidenced by his gross motor malfunctioning).

### Diagnosis by the investigator

Psychometric. On the Stanford-Binet an IQ of 52 and an MA of 7-9 were obtained by C-5. On the primary form of the Metropolitan Achievement Test he received a reading grade of 1.7. This reading grade, however, was not an accurate measure. It was discovered by the investigator that C-5 was guessing, and an informal reading test indicated that he was a non-reader.

Psycholinguistic. The pre-remediation profile is presented in Fig. 25. C-5 exhibited significant deficits in auditory-vocal sequencing, auditory discrimination, and sound blending. Thus, he appeared to have a deficit in the auditory-vocal channel at the automatic-sequential level. However, his auditory-vocal sequencing disability was the most severe since he obtained a LA of 3-3 on this subtest which was four years below his $\overline{\text{LA}}$ of 7-4.

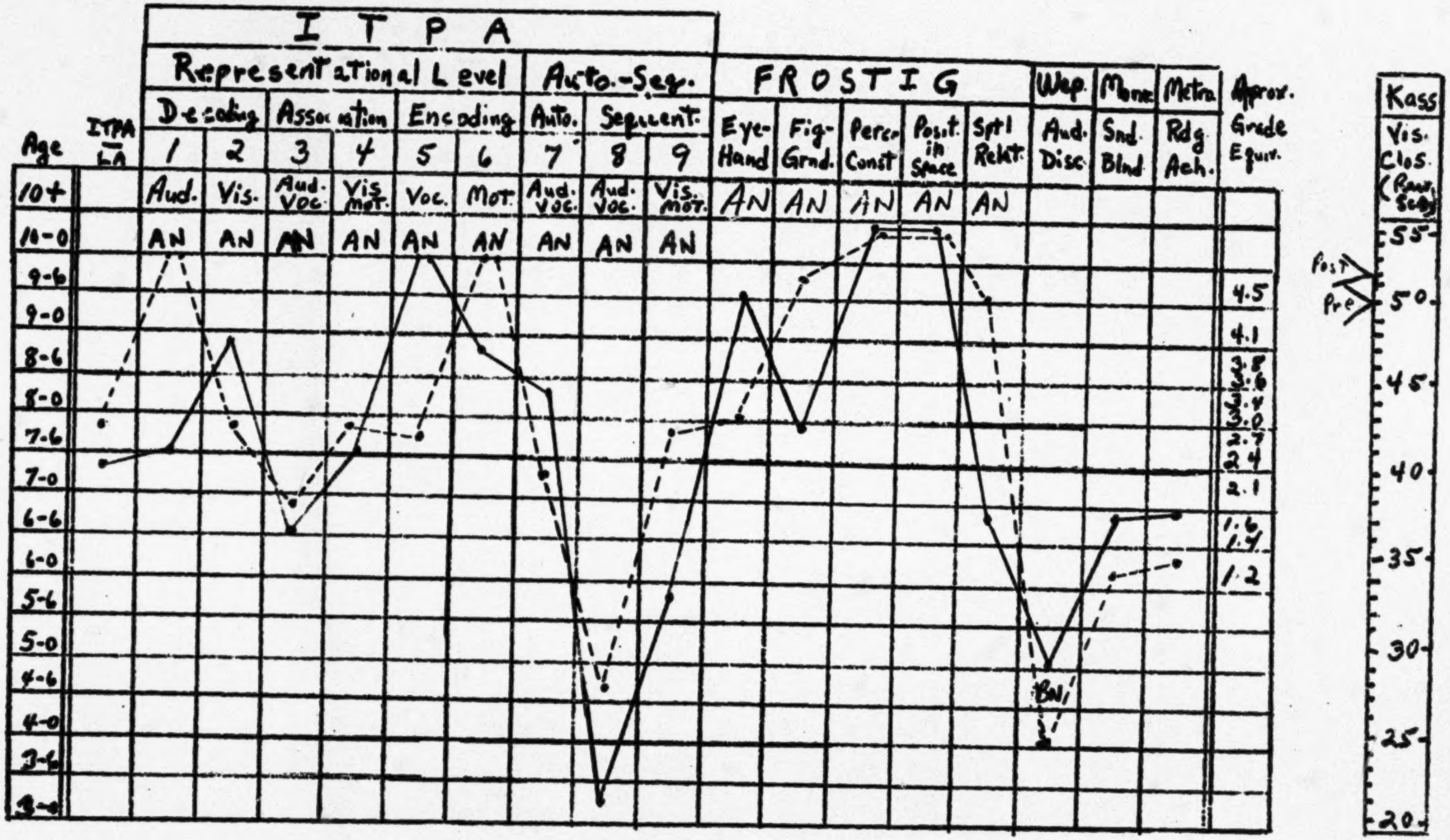
An asset in vocal encoding was found which may, however, have been misleading since C-5 was incessantly verbalizing, indicating perhaps some other underlying problem not defined by the psycholinguistic battery. Assets in three subtests of the Frostig were found (i.e., eye-hand coordination, perceptual-shape constancy, and position in space).

### Remediation

No remediation was given to C-5.

### Post-remediation test results

From the posttest profile presented in Fig. 25, it can be observed that an increase of 16 months was found in C-5's auditory-vocal sequencing scores. His level of functioning in auditory-vocal sequencing is still significantly below his posttest $\overline{\text{LA}}$ of 7-10; thus, a deficit in this area remained. No changes in C-5's sound blending and auditory discrimination scores were found. Therefore, it appears that his deficit in the auditory-vocal channel at the automatic-sequential level was comparable from pre- to posttesting. His $\overline{\text{LA}}$ increased six months from pre- to posttesting; however, on the whole, his two profiles are quite similar.



Pre-test —————— Post-test ------------

Fig. 25. Comparison of pre- and post-test results for C-5.

## Summary

C-5, a 15 year old boy, exhibited a deficit in the auditory-vocal channel at the automatic-sequential level on pretesting. This deficit was most pronounced in auditory-vocal sequencing. He was given no remediation. On post-testing no major changes in his deficits or his total profile were found.

## Integration of results related to remediation

The preceding case studies have been condensed and presented according to improvement or non-improvement on disability areas tutored or matched. These are presented in Table 10. Of the five Ss in group A, three improved greatly in deficit areas while two improved partly (A-1 and A-5); that is, they gained in one area treated, but not the other. It is of import to note that all Ss in group A showed improvement in one or both of their respective deficit areas. The two Ss who showed partial improvement (i.e., gain in one of two deficits) were tutored in two widely differing disability areas. A-3 and A-4 had two disabilities in related areas (e.g., encoding). One ramification of this result may be that 30 sessions is ample time to elicit gains in a single disability or two related ones (e.g., vocal and motor encoding), but not sufficient time to remediate two unrelated disabilities (e.g., visual-motor sequencing and sound blending) as in the case of A-1.

Table 10 reveals that of the five Ss in group B, two showed gains in their disability areas, three Ss showed no improvement at all. Interestingly, of the Ss in group C, the non-treatment group, only one (i.e., C-5) showed no improvement.

These findings then, as related to Hypothesis II, which predicted that group A would score greater gains than group B and that group B would show greater gains than group C, only partially bore out the prediction. This was so in that the case study comparison of the three groups

## Table 10

## Rating of Improvements in Disability Areas for the Three Treatment Groups on the basis of Case Study Profiles

| Subject | Tutored or Matched Area | Improvement<br>Group A | <br>Group B | <br>Group C |
|---|---|---|---|---|
| 1 | Visual-motor sequencing | No | No | Yes |
| | Sound blending* | Yes | - | - |
| 2 | Motor encoding | Yes | Yes | Yes |
| 3 | Vocal encoding | Yes | No | Yes |
| | Motor encoding | Yes | No | Yes |
| 4 | Visual-motor association | Yes | Yes | Yes |
| | Perceptual-shape constancy* | Yes | - | - |
| 5 | Auditory-vocal sequencing | No | No | No |
| | Perceptual-shape constancy* | Yes | - | - |

*Additional disability, area tutored only for group A.

revealed that group A improved more than group B. However, group A seemed about equal to group C in terms of whether or not there was improvement. Both A and C scored greater gains than did group B, thus providing no support for the latter aspect of Hypothesis II. This analysis does not reveal, however, how much improvement was made. This is explained statistically in the following discussion.

In order to determine whether these apparent differences between the groups were significant, an analysis of variance based on the randomized blocks design (Edwards, 1962) was performed. This analysis was applied to the differences between the pre- and post-remediation scores in the disability areas for each triad. Table 11 shows the gains, in months, made by the three groups according to matched deficit areas and individual _S_s. In terms of total gain for each group, group A gained 219 months, showing the greatest total gain of the three groups. Group C exhibited the next greatest improvement by showing a total gain of 139 months, followed by group B, which obtained a total gain of 75 months.

It is important to note that group A's total gain (i.e., 219 months) is actually an underestimation in terms of over-all gain. That is to say, not included in the total gain score for this group were two deficit areas which were tutored in group A, but which were not matched with the other two groups (see Table 10). A-1 and A-5 made significant gains in the areas that were tutored but not matched, while their gains in their tutored and matched areas were much less. Table 11 further reveals the matched deficit area (i.e., vocal encoding) for _S_s A-3, B-3, and C-3, which was randomly omitted for purposes of computation in the analysis of variance.

From this analysis, which is presented in Table 12, it can be observed that despite the non-statistical significance of the F value, there is an apparent trend which clarifies the findings obtained from the case studies (i.e., Table 10) to the extent that group A's gains were, numerically,

## Table 11

### Observations taken from Randomized Blocks Design Showing Gains, in Months, for Three Treatment Groups

| Subject | Tutored or Marched Area | Group A | Group B | Group C |
|---|---|---|---|---|
| 1 | Visual-motor sequencing | + 6 | 0 | +39 |
| | Sound blending* | +24 | - | - |
| 2 | Motor encoding | +40 | +24 | +27 |
| 3 | Vocal encoding** | +34 | + 4 | +43 |
| | Motor encoding | +87 | + 9 | +36 |
| 4 | Visual-motor association | +75 | +33 | +21 |
| | Perceptual-shape constancy* | +48 | - | - |
| 5 | Auditory-vocal sequencing | +11 | + 9 | +16 |
| | Perceptual-shape constancy | +30 | - | - |
| | $\Sigma$ | +219 | +75 | +139 |
| | $\bar{X}$ | 43.8 | 15.0 | 27.8 |

*Additional disability area tutored only in group A, but omitted from computation in this table.

**Disability area used in matching all three groups and tutored in group A, but randomly omitted from computation in this table.

## Table 12

## Analysis of Variance of Differences between Pre- and Post-remedial Scores in the Disability Areas for each Triad

| Source of Variation | Sum of Squares | df | Mean Square | F |
|---|---|---|---|---|
| Treatments | 2082.13 | 2 | 1041.06 | 2.24 |
| Blocks | 2723.06 | 4 | 680.76 | |
| Residual | 3716.54 | 8 | 464.57 | |
| Total | 8521.73 | 14 | | |

the greatest, followed by the gains of group C whose gains were greater than those of group B. Hence, there is some support for the prediction in Hypothesis II that gains made in group A would exceed the other two groups; but there is no confirmation for the prediction that group B's gains would be greater than those made by the non-treatment group C. In fact, group C appears to have improved more than group B.

Despite the lack of significance obtained in the analysis of variance above, the trend in gains favoring group A made it evident that further comparison of differences between the three groups in disability areas was necessary. Therefore, the Duncan Multiple Range Test (Edwards, 1962) was applied for the purpose of determining if each of the three means may not have been significantly different from one another. The results of this analysis revealed that group A's gains were significantly greater than those of group B (significant at .10 level); group A's gains did not differ significantly from those of group C; and the gains of groups C and B did not significantly differ from one another.

In order to determine whether the total profile of each group may have been enhanced by remedial treatment, an analysis of variance based on a randomized blocks design (Edwards, 1962) was performed which sought to examine the differences between the $\overline{LA}$s of the three groups. Table 13 reveals the $\overline{LA}$ gains obtained in this statistical treatment. Again, the trend observed in the foregoing analyses (i.e., Tables 10 and 11) was made evident. That is to say, that despite the lack of significance obtained from the F value in Table 14, greater individual $\overline{LA}$ differences were obtained for group A than for either group B or C; and group C exhibited greater $\overline{LA}$ gains than did group B.

A Duncan Multiple Range Test (Edwards, 1962) applied to the $\overline{LA}$ data revealed that: group A and group B were significantly different (at the .10 level) in terms of the gains made in $\overline{LA}$ differences. No significant differences were found between groups A and C or between groups B and C. Hence, the similarity to the analyses of disability area differences

## Table 13

### Observations taken from Randomized Blocks Design Showing Pre- and Post-remedial Differences between Mean Language Ages for Three Treatment Groups

| Subject | Group A | Group B | Group C |
|---|---|---|---|
| 1 | + 4.72 | + 8.33 | + 7.94 |
| 2 | +18.25 | + 5.22 | + 6.17 |
| 3 | +20.40 | - 3.69 | + 7.84 |
| 4 | +24.84 | + 8.83 | +12.71 |
| 5 | - 1.67 | + 7.61 | + 6.44 |
| $\Sigma$ | +66.54 | +26.30 | +41.10 |
| $\bar{X}$ | +13.31 | + 5.26 | + 8.22 |

## Table 14

### Analysis of Variance of Mean Language Age Differences Between Pre- and Post-Remediation for Each Triad

| Source of Variation | Sum of Squares | df | Mean Square | F |
|---|---|---|---|---|
| Treatments | 165.70 | 2 | 82.85 | 1.55 |
| Blocks | 212.73 | 4 | 53.18 | |
| Residual | 428.63 | 8 | 53.58 | |
| Total | 807.06 | 14 | | |

was evident in terms of partially supporting Hypothesis II. That is to say, there was a trend showing that gains made in group A exceeded both C and B, the latter (i.e., A vs. B) being significantly different.

## Summary of Results

### Descriptive results

Partial confirmation for Hypothesis I was obtained, in that the descriptive sample (N = 32) did not exhibit a deficit affecting the entire automatic-sequential level as predicted. The group performed below its expected level on two of the three automatic-sequential level subtests of the ITPA (i.e., auditory-vocal sequencing and visual-motor sequencing) and at its expected level on the third (i.e., auditory-vocal automatic); therefore, sub-hypothesis Ia, in which it was predicted that the group would perform significantly below its expected level on all three ITPA subtests at the automatic-sequential level, was partially supported.

The prediction made in sub-hypothesis Ib was not confirmed. The group did not perform significantly below its expected level on all subtests included in the extended model at the automatic-sequential level as predicted. Instead, only one subtest, perceptual-shape constancy, exhibited scores as hypothesized. In contrast, two subtests in the extended model (i.e., eye-hand coordination and sound blending) exhibited scores significantly above the expected level for the group.

Statistically, no support was found for sub-hypothesis Ic in which it was predicted that the total group would perform at its expected level on all representational level subtests, except for motor encoding on which performance would be significantly below expectancy. Two subtests (i.e., auditory decoding and auditory-vocal association) were significantly above expectancy and motor encoding revealed adequate group performance at the expected level.

Statistical analyses of the data which compared or emphasized means was seen as less meaningful, even though significant statistically, than data presented and examined in terms of dispersion and heterogeneity of obtained scores. The variability of the performances obtained on the subtests in this investigation gave support to the notion that group data could not always be generalized to all individuals.

### Remediation results

Analyses of case studies and of statistical results have shown that Hypothesis II was partially confirmed. Hypothesis II stated that group A, the experimental treatment group, would exhibit significantly greater improvement from pre- to post-remediation scores than would the comparison treatment group B and the non-treatment control group C. A trend, though not statistically significant in terms of the analysis of variance was evidenced for group A to show greater gains than groups B and C. This trend was further supported by the significant difference shown between group A and B on the Duncan Multiple Range Test performed on the means of the differences in the disability areas. However, there was no support for the remainder of the prediction in Hypothesis II that the comparison treatment group B would show significantly more improvement than the non-treatment group C. On the contrary, group C revealed greater gains than did group B.

# CHAPTER V

# DISCUSSION

In this chapter implications of the findings of the investigation are discussed as they relate to the descriptive (i.e., learning characteristics) and remedial results. Limitations of the study, recommendations for further research, implications for special education, and a concluding statement by the investigator are also presented.

## Learning Characteristics

The findings in this investigation have indicated that the group as a whole (N = 32) exhibited marked memory deficits in both the auditory and visual channels of the ITPA and a very significant disability in the area of perceptual-shape constancy. The memory disabilities pertain to the automatic-sequential level of the ITPA, whereas the latter disability pertains to the extended psycholinguistic model on the same level.

Significant abilities were shown by the group in auditory decoding and auditory-vocal association, both of which are at the representational level of the ITPA. Additional abilities were revealed in the eye-hand coordination and sound blending tests of the extended model.

That the group ITPA profile did not adhere to the "typical" profile for mentally retarded children posited by Bateman and Wetherell (1965) is of great interest, especially since it was predicted that the Ss in this study would exhibit this "typical" profile on the ITPA; that is, there would be a deficit for the entire automatic-sequential level, and a deficit in motor encoding at the representational level. Two reasons seem to emerge to explain the non-typicality of the profile. First, it may be argued that the emotional involvement of the sample impeded the attainment of a profile "typical" of the retarded. However, neither did the group achieve an ITPA profile similar to that of Graubard's (1965) group who were all emotionally disturbed (i.e., acting-out boys), but not mentally retarded. Therefore, the very nature of the sample in this investigation, that is, mental retardation in association with emotional disturbance, may have precluded obtaining a "typical" profile.

Insofar as the present sample exhibited a marked deficit in auditory and visual memory, as did the Ss surveyed by Bateman and Wetherell (1965), this finding may be seen as support for the hypothesis suggested by Ellis (1963) in which it is stated that the mentally retarded may evidence a short term memory deficit because of a possible central nervous system dysfunction. Ellis, however, appropriately cautioned against premature application of such findings until more definitive evidence could be offered.

Secondly, the hazard of generalizing a set of learning characteristics (i.e., "typical" profile) has been made evident in this study by the heterogeneity within the sample and, in particular, the variability of its performance on every subtest administered (see Fig. 10). Furthermore, a generalization of this sort seems to be contradictory to what has been defined as the learning disabilities approach in that a global assumption has been made (about a "typical" profile), thereby precluding further, in depth examination of abilities or disabilities. Therefore, heterogeneity rather than typicality must be emphasized in describing and diagnosing the children. In this respect the investigator concurs with Lipman (1963) who believes that there is no single psychological factor or generalized deficit in the mentally retarded, or, for that matter, in other etiological classifications; but that learning deficits are attributable to the interaction of many variables, and a child weak on one area need not be weak in another.

Of further interest were the significant strengths shown by the total group in auditory decoding as well as in auditory-vocal association, both of which are representational level subtests and rely upon meaningful, auditory intake of the spoken word. Since these are related areas, a possible explanation as to the group's relative strength in this area is worth noting. In that the *S*s were all in placement at a residential school where many services (e.g., social work, psychiatry, teaching) thrive simultaneously, each child is the recipient of a great deal of verbal instruction, counseling, and other meaningful discourse, all requiring, to some degree, "feedback" from the child. In view of the nature of such services, verbal instructions would tend to be followed up by either new verbal instructions or a reiteration of the same ones in the event of no "feedback" (e.g., from the child to the therapist). Hence, the possibility exists of inadvertently training the auditory channel to receive meaningful information.

## Remediation

### *Group A*

The experimental group, having received treatment based on a learning disabilities approach, exhibited a gain in $\overline{LA}$ of 13 months from pre- to posttesting. Of the three groups, this was the most improvement in terms of an overall measure (i.e., gains revealed for groups B and C were five months and eight months respectively). It was found that group A's remediation was effective in most areas, but not, however, in all. For example, improvement was shown by the children tutored for their deficits in either visual-motor sequencing or auditory-vocal sequencing, but the gains in these areas were slight (i.e., six months for the former; eleven months for the latter); whereas gains made in the other areas, especially those at the representational level, were greater. In this respect, these results support those of Wiseman (1965) who also found a discrepancy in the remediability of representational level deficits as opposed to automatic-sequential level deficits on the ITPA.

The question arises, then, as to why the areas of visual and auditory memory should have been so difficult to train. For one thing, the time in training (i.e., 30 sessions) may have been insufficient to ameliorate the memory deficits. In that some gain, though slight, was revealed in each of these areas, it is reasonable to assume that the time allowed was adequate enough to foster substantial improvement on representational level disabilities, but that more time was required to ameliorate deficits in memory, at the automatic-sequential level. This explanation is tenable in view of the finding that in the time allowed, more gains were shown in related deficit areas (e.g., encoding) for a single S, than were shown by a S where training was in two apparently unrelated areas (e.g., sound blending and visual-motor sequencing). Therefore, it may not have been a matter of non-remediability of these memory areas, but of the duration of time provided in training them.

A second explanation for the apparent difficulty in modifying visual and auditory memory involves the nature of the remediation itself. In tutoring other deficit areas, the methodology as well as materials employed were usually highly structured. This was so in remediating representational level deficits as well as in disabilities found on other automatic-sequential level subtests (e.g., perceptual-shape constancy in the extended psycholingulistic model). In the latter, for example, the Frostig program (Frostig and Horne, 1964) provided for specific, structured, sequential lessons. On the other hand there are no ready-made materials for training memory. In the remediation of memory deficits, the investigator attempted to train with a variety of items and materials (see case studies A-1 and A-5) which, although seemingly applicable to memory training, were probably "spread too thin" to account for a necessary transfer of training in order to show improvement on retesting. The implication here, then, is for more specific item training, perhaps on items as closely related to the actual memory function tested as possible, with gradual expansion to materials and techniques which are further removed but would eventually facilitate transfer.

Groups B and C

Of great interest and surprise was the unexpected finding that group C exceeded group B in overall gain. Obviously, the question arises as to why a group receiving no remedial treatment should "improve" more than a group which did receive treatment, particularly when matched on the same disabilities.

An explanation may be found in the nature of the treatment given group B since remediation for this group has previously been defined, in part, as global or traditional. It was ascertained that group B treatment did not always fit the diagnosis, was not always systematic in approach, overlooked specific deficit areas because of a previously gross classification (e.g., emotional disturbance) or lack of readiness, and the like. One case in point is represented by that of B-5, in which the developmental, non-specific reading program administered had no relationship to the diagnosis or recommendations for remediation originally suggested by the same staff remediator who treated the child. In this respect, then, it is reasonable to assume that some of the remediation performed in group B actually impeded rather than enhanced learing for the children involved. This gives credence to Bryant's (1964) notion that remedial procedures often obscure the specific learning they are trying to bring about.

Conversely, it is possible that some Ss in group C inadvertently received appropriate training in their disability areas. This explanation is not as remote as it may appear since, ~~for example~~, C-3 exhibited substantial gains in his deficit areas (i.e., both vocal and motor encoding) and, it was subsequently discovered, he was actively experiencing vocational training. The job which he acquired during the investigation apparently required C-3 to express himself both vocally and motorically. It is noteworthy that the remainder of C-3's profile remained relatively consistent from pre- to posttesting. This may also explain the performance of some of the group B *S*s (i.e., B-1 and B-2) who had coincidentally received outside stimulation which was consistent with their deficit areas. These findings are not unlike those of Hermann (1962) who discovered that the control *S*s, presumably receiving no treatment, made significant gains in some psycholinguistic areas. She attributed these gains to outside influences over which little control could be exercized.

### Conclusions Based on Remediation Results

The findings of the remediational aspects of this investigation have shown that the learning disabilities approach to diagnosis and remediation, in comparison to a global approach, was more successful. This conclusion is evident in view of the statistical and case study analyses performed, both of which revealed that group A's gains were substantially greater, and in some cases significantly so, than those gains made by group B. That group C, the non-treatment control group, also improved more than did group B may further amplify the inadequacies of the global or traditional approach. This outcome, however, is difficult to explain except in terms of coincidental, extraneous training over which little control could be exercised. This result has been likened to Hermann's findings (1962).

Other psycholinguistic, remediational studies have found that the experimental group showed significantly greater gains than did their non-treatment controls (e.g., Smith, 1962; Hirsch, 1963; Wiseman, 1965). The findings of this investigation tended to support those findings in trend if not level of significance where experimental treatment group vs. non-treatment group were considered.

With respect to controlling for the "experimenter" or "attention" factor, the substantial gains made by group A over those of group B provided evidence that attention was not responsible for these gains since both groups received it. Therefore, the gains made by group A cannot be attributed to attention but to the treatment given, that is, the learning disabilities approach. Group C is not relevant in this respect in that it did not receive remedial attention; thus, it could not be used to discriminate between the effects of attention and treatment.

## Limitations of the Investigation

### Size of Sample

In terms of the descriptive aspect of this study, in which certain learning characteristics were surveyed, the size of the sample (N = 32) was restricted, but acceptable when compared to the number of Ss employed in similar, relevant research (e.g., Kass, 1962; Graubard, 1965). However, the remediation aspect of the study may be open to criticism in view of the limited number of Ss in each of the three groups (N = 5). Since the investigator had a restricted population at the outset, however, this limitation could not be overcome.

### Duration of Remediation

Thirty sessions did not seem to fully allow for adequate remedial treatment. Since it is believed that for certain deficits (e.g., auditory-vocal sequencing) only a start was made toward amelioration, an increase in the number of sessions would probably have shown greater gains. This possibility, however, does not vitiate the fact that significant gains were made in other deficit areas within the number of remedial sessions employed.

### Matching

The scope of the investigations as well as the limited number of children precluded the matching of Ss on certain variables traditionally employed in statistically-oriented and psychological research (e.g., CA and sex) in addition to the psycholinguistic characteristics upon which they were matched.

### Nature of the sample

The problems generated in working with children who are emotionally disturbed as well as mentally retarded are more complicated and not as simply managed as problems which might occur as a result of the latter handicap itself. There was often great emotional variability exhibited by the children not only from pretest to posttest, but from day to day. Probably such variability was one of the factors which contributed to the vast heterogeneity within the group's performance.

### Control of outside influences

Several Ss appeared to profit (i.e., gain) from extraneous activities which inadvertently contributed to the amelioration of their learning deficits.

It was assumed that all Ss in the three treatment groups would have equal exposure to any external influences provided in the institution or environment at large. Such complete control was neither possible in this investigation, nor does it appear possible to control all factors in studies of this type.

### Need for supplementary diagnosis

The early remedial sessions conducted by the investigator with Ss in group A contained a few additional "informal" tests which served to secure a more descriptive, diagnostic picture of his experimental Ss. This supplementary evaluation which included, for example, laterality tasks and identification of body parts from the Kephart (1960)

Perceptual Survey Rating Scale, served to increase, in depth, the information gleaned from the basic diagnostic battery administrered to all _S_s. In turn, this seemed to increase the efficiency of the remediation with certain _S_s (e.g., in motor encoding). Although this is not in itself a limitation, it is believed that if such additional diagnoses were given as part of the initial battery, the diagnoses for all _S_s would have been enhanced in breadth as well as in depth.

## Recommendations for Further Study

### Diagnosis

Increased effort should be given to improving the learning disabilities approach to diagnosis both in depth and in breadth. Such improvement would include the application of instruments and techniques which are often diagnostic afterthoughts to batteries which, in themselves, are frequently incomplete and haphazard. In terms of increasing depth, for example, the ITPA, which is more nearly a diagnostic-screening test than simply diagnostic, cannot carry the entire burden of diagnosis in its present form. For example, the motor encoding subtest of the ITPA measures only one aspect of motor functioning, that is, the meaningful aspect. It does not reveal performance in directionality, laterality, or body image which are motor encoding functions on a non-meaningful level. A further example can be found in the visual-motor sequencing subtest which assesses visual memory on a non-meaningful level using only one type of material. The test tells us little about visual memory with other non-meaningful items such as letters, numbers, and the like, nor does it assess visual memory for meaningful material. A diagnostic profile would be enhanced in depth by the employment of such tests which evaluate these functions, where previously they were only partially assessed.

Expansion of the psycholinguistic model in breadth so that it includes more processes than those involved in the current ITPA model (see Fig. 1) is necessary. Kirk (1966) has presented a revised model which includes such added functions as haptic decoding, haptic-vocal and haptic-motor association, perceptual decoding, imitative encoding, and haptic memory. The new model of communication processes may help to determine additional areas of known or suspected disability for the purpose of further examination. Research with such an expanded model will help to clarify relationships and functions not presently included in the ITPA.

Additional recommendations worth noting concern Kass' test of visual closure (1962), which was employed as an automatic-sequential level subtest on the extended model of communication processes in this investigation. For one thing, the test seems valid in that it does appear to assess, in some measure, the ability of a child to anticipate what a completed image would be from an incomplete picture. Therefore, the potential value of this instrument seems assured provided that further research will do the following: (a) develop an alternate form so that test-retest results can be reliably determined and not impeded by a learning or practice effect which definitely occurs on initial testing; (b) revise the normative data so that the norms will extend into populations above and below normal intelligence (e.g., the mentally retarded); and (c) employ age norms in addition to standard scores so that the scores of the test can be plotted on a diagnostic profile which is based on comparative age scores.

### Remediation

One of the most pointed needs for research which has been amplified by this investigation is the need for new and better methods to remediate short-term memory deficits. Since there seemed to be a clear differentiation between the more cohesive approaches to treating representational level deficit~~s and~~ those disabilities found in some areas of visual perception (e.g., perceptual-shape constancy), attention and further study should be geared toward developing specific, programmatic techniques of coping with the visual and auditory memory problems (if not all psycholinguistic problems) such as those prescribed in other remedial programs (e.g., Frostig and Horne, 1964; Kephart, 1960).

Investigation also seems warranted for the purpose of attempting to attain a "transfer of training" effect to such a degree that remediation of a deficit with certain materials or techniques transcends merely the remediation of a very specific area. For example, can we devise a way to train or condition visual-motor sequencing using forms, colors, etc. so that it remediates all areas of visual-motor sequencing and not just form sequence, color sequence, or the like in isolation?

In remediation research where methods and effect of treatment are compared, the need for certain controls is imperative. As in this investigation, there should be at least a comparison treatment group. Where the number of *S*s permits, a fourth group should be included for the purpose of controlling for the effects of attention (i.e., a placebo group). Ideally, the present study should have employed four treatment groups--experimental, comparative, attention, and non-treatment--rather than the three groups used, although the design of this investigation does represent an improvement over previous studies. Furthermore, a recommendation based on the findings of this investigation points up the desirability of complete control over extraneous or outside influences on all *S*s. Unless the assumption can be made that each *S*, regardless of treatment group, has identical exposure to all variables aside from the treatment itself, the experimental approach or methods implicit in the design of research can be questioned.

It is strongly urged that case study reporting be adopted in future research. This and other research (e.g., Kirk, 1966; Wiseman, 1964) have shown the depth and potency of information which can be obtained from case studies in contrast to the limited conclusions which can be drawn from statistical analyses alone.

Of great import is the need for longitudinal remediation research. Unfortunately, the scope of this investigation was prohibitive in terms of time devoted to treatment; it does emphasize, however, Balow's (1965) implication that long term remediation would produce greater and longer-lasting gains. This claim could be substantiated only by follow-up, evaluative studies.

### Implications for special education

The learning disabilities approach is seen as the basis for a much needed revitalization of certain aspects of special education, and is particularly relevant to the special classroom and training of special education teachers. Undeniably, the vast heterogeneity of learning characteristics within such populations as the mentally retarded, emotionally disturbed, or brain injured has negated the long held view that these are homogeneous groups, and therefore can be taught on the basis of such global concepts as, for example, IQ or MA. This global or traditional view of the mentally retarded (i.e., that they are a homogeneous group) can only be dispelled if each child so designated can somehow be diagnosed and taught on the basis of "within-child" differences.

This investigation has demonstrated the feasibility of tailoring a program to the child. Once this has been done, organizing programs on a group basis can be facilitated. The implication is clear as to the need for homogeneous grouping based on learning characteristics. Grouping children with similar perceptual difficulties, auditory memory deficits, or visual decoding problems, for example, may be more promising than categorizing them as mentally retarded or brain injured per se. Therefore, further examination and study in this respect should provide evidence that grouping in the special class would be more efficient with the learning disabilities approach.

A learning disabilities approach suggests implications for the development of curriculum and materials in teaching the mentally retarded. In contrast to the global approach wherein curricula and materials are often rigidly directed at all children in the class, the learning disabilities approach would call for the materials and curricula as they fit one or more children within the class. In effect it would permit the remediation or education to fit particular disabilities and characteristics of the children. Since studies have shown that the learning disabilities approach has been successful when used in a one-to-one remedial situation, special educators should now direct their research toward the classroom where little has been done in this respect. Herein lies important implications not only for grouping, curriculum, and methods, but for the professional preparation of teachers as well.

Teacher preparation programs in special education should be redesigned in order to incorporate those skills which are essential characteristics of teaching via the learning disabilities approach. The teacher who uses this approach in the classroom must be competent to teach diagnostically, evaluate, refer, remediate--in effect, to be clinical.

## Concluding Statement

It can be asserted with confidence that children, like snowflakes or fingerprints, do not reveal the same intrinsic designs from child to child. If this is so for normal children, then doubtless it is doubly so for handicapped children.

To bring this assertion a step further, unlike snowflakes or fingerprints, in which the pattern remains constant until destroyed, the pattern within the child is modifiable, both by internal or external influences, as he develops and grows to maturity. That is to say, the child's behavior or performance pattern is alterable through the simple fact of growth as well as by the learning stimulated in the world around him. These are axioms upon which education, particularly special education, is predicated. Beyond them, however, there are points of departure regarding the philosophies, approaches, and specific methods used by the educator.

One approach, the learning disabilities approach to diagnosis and remediation, has been tested and evaluated in this investigation. Despite its experimental state, this approach seems to encompass principles and practices which provide the integrating element for all of special education, particularly if the essence of special education is seen as continual diagnostic or clinical teaching. In this respect, the approach is a significant step toward what Kirk and Bateman (1962) called a "scientific pedagogy."

It is clear that the instruments applied are sometimes limited in assessing the full extent of a child's pattern of abilities or disabilities. It is also clear that clinical and remediational judgments need refinement. But these imperfections are what such experimentation is designed for; it no longer suffices to say that any method (or instrument) will do as long as it is applied in a consistent fashion. This is a pedagogical fallacy which precludes and obstructs consideration of the individual child and the understanding of his particular learning or behavior pattern.

In the education of mentally retarded, emotionally disturbed, or other handicapped children, then, the efficacy of the learning disabilities (i.e., psycholinguistic) approach does not rest solely on its attempts to isolate aspects of behavior. It resides in the attempt to recognize these single characteristics (whether weaknesses or strengths) as meaningful aspects in the child's behavior as a whole.

# CHAPTER VI

## SUMMARY

### Statement of the Problem

The two objectives of this study were: (1) to investigate and describe the learning characteristics of a group of mentally retarded-emotionally disturbed children, and (2) to test the effectiveness of the psycholinguistic approach to the remediation of learning disabilities.

### Objectives

For the purpose of projecting specific hypotheses, the following relevant areas were reviewed: the nature of the population, approaches to remediation, the psycholinguistic profile approach, and research with the ITPA.

Hypothesis I was derived from Bateman and Wetherell's finding (1965) that the mentally retarded show deficits in psycholinguistic functioning at the automatic-sequential level of the ITPA (McCarthy and Kirk, 1961). It was predicted in Hypothesis I that the subjects in the present sample, insofar as they approximated those of Bateman and Wetherell, would reveal similar learning characteristics to those found by these authors (i.e., deficits at the automatic-sequential level). In addition, the following sub-hypotheses were posited.

Hypothesis Ia: This group will perform significantly below its expected level on the three automatic-sequential level subtests of the ITPA. Hypothesis Ib: This group will perform significantly below its expected level on the following tests at the automatic-sequential level: the five Frostig subtests, the Monroe Sound Blending Test, the Wepman Auditory Discrimination Test, and Kass' Visual Closure Test.

Hypothesis Ic: This group will perform at about its expected level on the representational level of the ITPA with the exception of the motor encoding test on which it will perform significantly below its expected level.

Since a major purpose of this study was to test the effectiveness of the psycholinguistic approach to diagnosis and remediation by comparing it to a more conventional approach, Hypothesis II predicted: the experimental treatment group will show significantly greater improvement from diagnostic pretest scores to posttest scores than the comparison treatment group and the non-treatment group, while the comparison treatment group will show significantly more improvement than the non-treatment control group.

## Method

### Subjects

Thirty-two mentally retarded-emotionally disturbed children from the Edenwald School, a residential treatment center, comprised the descriptive sample. The sample consisted of 18 males and 14 females with a mean CA of 12-6, mean MA of 7-4, and mean IQ of 61.

From this group 15 Ss were screened for participation in the remedial aspect of the study. On the basis of the diagnostic pretest battery these 15 Ss were matched into triads in accordance with observed psycholinguistic weaknesses and strengths. The Ss in each of the five triads were randomly assigned to one of three treatment groups (i.e., experimental, comparison, or non-treatment).

### Measuring instruments

The diagnostic pretest battery consisted of the following tests: the Stanford-Binet Intelligence Scale, Form L-M (Terman and Merrill, 1960); the reading test of the Metropolitan Achievement Battery (1960); the ITPA (McCarthy and Kirk, 1961); the Sound Blending Test from the Monroe Diagnostic Examination (1932); the Visual Closure Test (Kass, 1962); the Auditory Discrimination Test (Wepman, 1958); and the Developmental Test of Visual Perception (Frostig, 1961).

### Procedure

The diagnostic pretest battery was administered to each of the 32 *S*s. From the results of this screening battery, two judges made independent analyses to determine psycholinguistic abilities and disabilities. The criteria for determining a disability was an age score two years below the child's own mean language age ($\overline{LA}$). Five triads were matched on the basis of similar psycholinguistic characteristics. The *S*s in each triad were then randomly assigned to one of the three treatment groups.

The *S*s in the experimental treatment group (i.e., A) were tutored by the investigator who used the psycholinguistic approach to diagnosis and remediation. The comparative treatment group (i.e., B) was tutored by remedial specialists employed by the Edenwald School. They used a traditional or global approach to diagnosis and remediation. The A and B approaches were operationally defined as differing in their basic views of learning disabilities, the nature of the diagnosis, their concepts of readiness, and the nature of remediation. Group C received no treatment.

All *S*s in groups A and B were seen individually at regular intervals for a total of 30 half-hour sessions. All 15 *S*s were then re-examined on all instruments previously administered with the exception of the Stanford-Binet Intelligence Scale.

## Results

### Results related to descriptive characteristics

To test each of the three sub-hypotheses of Hypothesis I, those concerning the descriptive aspect of the study, only the pretest scores were used. In order to determine whether the differences between obtained scores and expected levels were significant, t tests based on Edwards' (1962) randomized blocks design were applied. The $\overline{LA}$ for all ITPA subtests was used as the expected level.

The findings indicated that the group as a whole exhibited marked memory deficits in both the auditory and visual channels of the ITPA and a significant disability in the area of perceptual-shape constancy. These three deficit areas were at the automatic-sequential level. Significant abilities were shown by the group in auditory decoding and auditory-vocal association, both of which are at the representational level of the ITPA. Two abilities at the automatic-sequential level were also revealed (i.e., eye-hand coordination and sound blending).

Thus, partial confirmation for Hypothesis I was obtained in the sense that the descriptive sample did not exhibit a deficit affecting the entire automatic-sequential level as predicted. The group performed below its expected level on two of the three automatic-sequential level subtests of the ITPA (i.e., auditory-vocal sequencing and visual-motor sequencing) and at its expected level on the third (i.e., auditory-vocal automatic), thereby supporting, in part, sub-hypothesis Ia. The prediction made in sub-hypothesis Ib was not confirmed in that only one subtest, perceptual-shape constancy, exhibited scores as predicted. Two subtests (i.e., eye-hand coordination and sound blending) exhibited scores significantly above the expected level for the group.

Statistically, no support was found for sub-hypothesis Ic in which it was predicted that the total group would perform at its expected level on all representational level subtests, except for motor encoding on which the performance would be significantly below expectancy. Two subtests (i.e., auditory decoding and auditory-vocal association) were significantly above expectancy and motor encoding revealed adequate group performance at the expected level.

Analyses of the data which emphasized means was seen as less meaningful, even though statistically significant, than data which were examined in terms of the dispersion and heterogeneity of obtained scores. The variability of the performances obtained on the subtests supported the notion that group data could not always be generalized to all individuals.

### Results related to remediation

To test Hypothesis II, an analysis of variance based on the randomized blocks design (Edwards, 1962) was employed. This analysis was applied to the differences between the pre- and post-remedial scores in the disability area for each triad. The findings relative to the remedial aspect were also examined in the form of case studies.

Analyses of the case studies and statistical results revealed that Hypothesis II was partially confirmed. A trend, though not statistically significant in terms of the analysis of variance, was evidenced in that group A showed greater gains than did groups B and C. However, the Duncan Multiple Range Test (Edwards, 1962) applied to the $\overline{\text{LA}}$ data of the three groups revealed that group A's gains were significantly greater (at the .10 level) than those of group B. Group A's remediation was effective in most areas, but not all. Slight gains were made in auditory-vocal sequencing and visual-motor sequencing as compared with substantial gains on the representational level tests. There was no support for the remainder of the prediction in Hypothesis II that the comparison treatment group B would show significantly more improvement than the non-treatment group C. On the contrary, group C unexpectedly revealed greater gains than did group B.

## Discussion

### Learning characteristics

The descriptive results for this sample did not adhere to the "typical" profile for mentally retarded children posited by Bateman and Wetherell (1965). Two reasons seem to emerge to explain the non-typicality of profile for Ss of the present study. First, it may be that the emotional involvement of the sample impeded the attainment of a profile "typical" of the mentally retarded. Secondly, the hazard of generalizing a set of learning characteristics (i.e., "typical" profile) has been made evident in this study by the heterogeneity within the sample. Therefore, it seems that heterogeneity rather than typicality should be emphasized in describing and diagnosing children.

The marked deficit in auditory and visual memory found in this study may be related to Ellis' notion that the mentally retarded evidence a short-term memory deficit. The significant strengths of the group in auditory decoding and auditory-vocal association may be related to the fact that many of the services (e.g., social work, psychiatry, etc.) provided at the Edonwald School may inadvertently train the auditory channel to receive meaningful information.

## Remediation

The findings for the remedial aspect of this study have shown that the learning disabilities approach (A) to diagnosis and remediation was more successful than a global approach (B). This conclusion, concerning the effectiveness of the learning disabilities approach, seemed tenable since the factor of attention had been controlled through the inclusion of the comparison treatment group. That group C, the non-treatment group, improved more than group B further amplifies the inadequacies of the global or traditional approach. It is reasonable to assume that some of the remediation performed in group B actually impeded rather than enhanced learning for the children involved. The results for group C, however, are difficult to explain except in terms of coincidental, extraneous training over which little control could be exercised.

The areas of visual and auditory memory were found to be difficult to train. One explanation for this finding was that thirty sessions may have been insufficient time to ameliorate memory deficits. Another explanation may be that in attempting to remediate short-term memory deficits with a variety of items and materials, the training was spread "too thin." Thus, training may have to be more specific to the actual memory function tested with gradual expansion to materials and techniques which are further removed but would eventually facilitate transfer of training.

### Limitations, recommendations, and implications

Certain limitations of the investigation were considered. These were explored in the following categories: (1) size of the sample; (2) short duration of remediation; (3) limited basis for matching; (4) problems due to the emotional disturbance of the sample; (5) difficulty in controlling outside influences; and (6) need for supplementary diagnosis.

Various recommendations for further study were suggested. It was proposed that increased effort should be given to improving the learning disabilities approach to diagnosis both in depth and in breadth. Certain tests were seen as potentially valuable diagnostic tools, but currently in need of refinement.

It was also proposed that in the area of remediation there is a need for new and better methods to remediate short-term memory deficits.

In view of some of the findings of this investigation the desirability of complete control over extraneous or outside influences on all Ss was also noted.

It was strongly urged that case study reporting be adopted in similar research. It is believed that information may be obtained from analyses of case studies which might otherwise not be ascertained from statistical analyses alone.

Finally, it was noted that the need for longitudinal research in remediation was of great import.

In terms of the implications for special education, the learning disabilities approach is seen as the basis for a much needed revitalization. The approach is particularly relevant to the special classroom and training of special education teachers. In this respect there are important implications for grouping, curriculum, methods, and materials used in teaching. Furthermore, it is strongly urged that teachers should be trained in the skills required to teach clinically and diagnostically; such skills are implicit in a learning disabilities approach.

## Conclusion

It was posited that the learning disabilities approach to diagnosis and remediation, despite its experimental state, encompasses those principles and practices which provide the integrating element for all of special education. This is particularly so if the essence of special education is seen as continual diagnostic or clinical teaching.

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